

ARTHROPODS OF FLORIDA

AND NEIGHBORING LAND AREAS

VOLUME 9

Ichneumoninae of Florida and Neighboring States

(Hymenoptera: Ichneumonidae, subfamily Ichneumoninae)

by
Gerd H. Heinrich

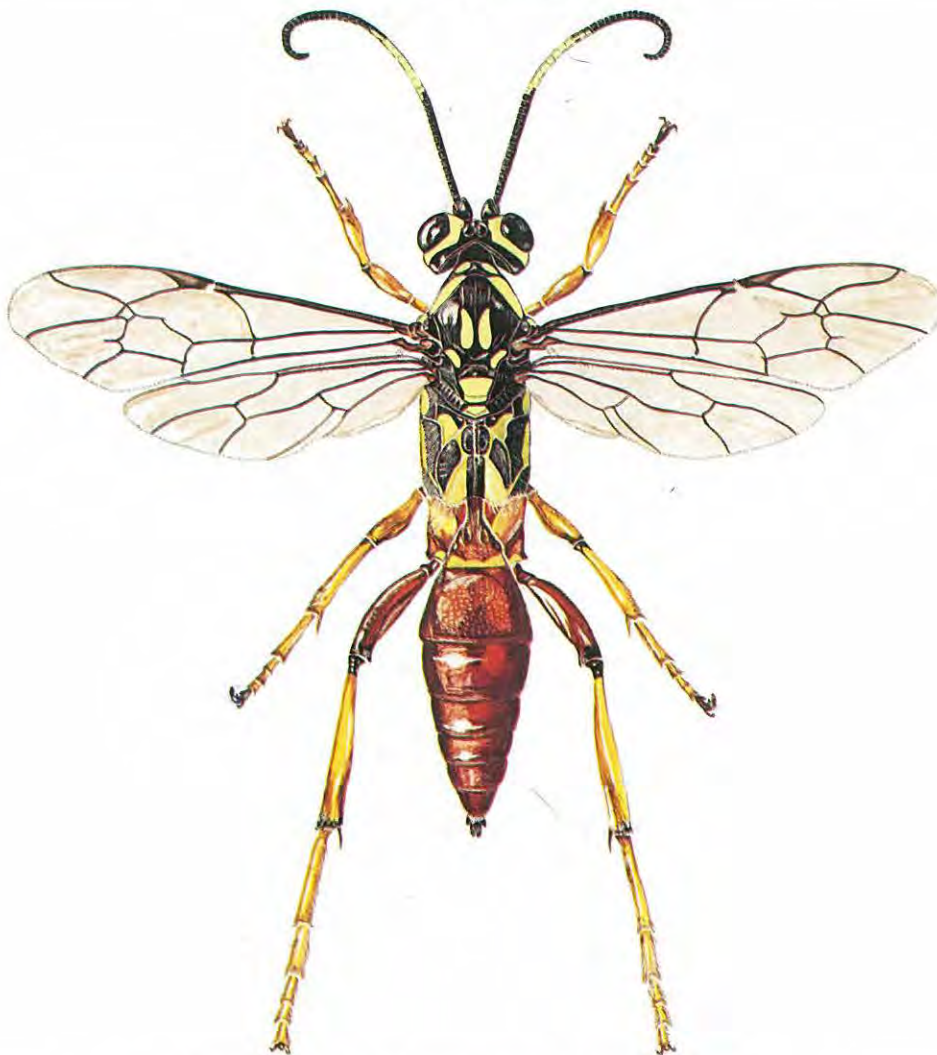


Plate 6. *Carinodes havanensis* Cameron, female

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

Doyle Conner, Commissioner

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by
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FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
Doyle Conner, Commissioner

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Map 155. *Terebraella culiciops* Heinrich

FOREWORD

"Ichneumoninae of Florida and neighboring states" encompasses all of Florida except the southern tip of the peninsula, most of South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, eastern Texas, eastern North Carolina, and smaller parts of western Tennessee, southeastern Missouri and southwestern Kentucky. This work contains keys for identification and full structural and chromatic descriptions of 50 genera and 135 species and subspecies of the subfamily Ichneumoninae. Of the 135 forms treated in this publication, 47 previously were not known to science. All known Ichneumoninae are specialized parasites of Lepidoptera. The female deposits a single egg in the body of the host, either in the larva or pupa. Adults are rovers and may travel fairly long distances in the course of their random flight. While most aculeate Hymenoptera occur in open, dry, and hot habitats, and do not avoid the direct radiation of the sun, Ichneumoninae are, in general, confined to the shade of forests and to areas with comparatively high humidity. Few species have adapted to drier locations, and in semiarid regions Ichneumoninae are almost entirely absent. Most species are active only during early morning and late afternoon, except on cloudy, overcast days. Presence of host species is not the only limiting ecological factor; climate and biotype appear to be of equal, if not greater, importance. Globally the Ichneumoninae have proliferated in speciation only in the moderate and cool climates, diminishing as one approaches the tropics, except at higher elevations. In Ichneumoninae differences between the sexes are extraordinarily great in morphology as well as, sometimes, in coloration, affecting almost every part of the body. Often many specimens of 1 sex may be found before a single specimen of the opposite sex is discovered. Individual variations which occur within both sexes of a species further complicate an understanding of the taxonomy of the group.

The author, Gerd Herrmann Heinrich, is recognized as the world's leading authority on the subfamily Ichneumoninae, family Ichneumonidae. He is the author of 4 major publications on Ichneumonidae, 4 popular travelogs, 93 smaller but significant publications on Ichneumoninae, 3 publications on European mammals, 3 publications on the biology of the birds of Angola, and 2 publications on the systematics of the birds of Angola coauthored with Dr. S. Dillon

Ripley, formerly of Yale University and currently Secretary of the Smithsonian Institution. In print is a publication (in Russian) on the Siberian Ichneumoninae being published in Moscow by the Russian Academy of Sciences.

Heinrich's major publications were "The Ichneumoninae of Celebes" (German language, 1943, 265 pages, 7 plates of figures); "Les Ichneumonides de Madagascar" (French language, 1938, 139 pages, 6 plates); "Synopsis of Nearctic Ichneumoninae Stenopneusticae with particular reference to the Northeastern Region (Hymenoptera)" (English language, 1961-1962, 7 volumes, 886 pages, numerous illustrations); "Synopsis and reclassification of the Ichneumoninae of Africa south of the Sahara" (English language, 5 volumes, 1,258 pages, numerous text figures). Heinrich has described 1,383 species and subspecies of Ichneumoninae (Nearctic:334, Africa:408, Madagascar:87, Celebes 156, Palearctic:398). Travelog books were about Heinrich expeditions, including 1 on the Celebes Island (1932), 1 on Burma (1940), and 1 on Persia (1933).

Gerd Heinrich was born in Berlin, Germany on 7 November 1896, son of a physician, Dr. Herrmann Heinrich and Margarethe von Tepper-Ferguson Heinrich, heir of a large agricultural estate in the German province (since 1918, Polish) of West Prussia. He was educated at home by a tutor until his 9th year, graduated "primus omnium" from the Askanische Gymnasium in Berlin in 1914, at the age of 17, planning, like his father before him, toward a career in medicine. His education was interrupted by the declaration of war between Germany and Russia. He entered the German Army in the cavalry and subsequently became a pilot in the German Air Force. Following World War I, the family estate became a part of Poland where Gerd married and lived with his family. Poland was invaded by Germany in 1939 and World War II began. A series of bizarre incidences followed, during which both he and his wife were, for a time, on the "death list" of the Gestapo, but through the aid of a close friend from World War I, who, meanwhile, had become a General in the German Air Force, he and his wife were rescued. Gerd, in an effort to survive, reentered the German Air Force over which the Gestapo had no authority. Near the end of World War II, leaving all that they owned in

Russian-occupied Poland, he and his family escaped to West Germany under extremely dangerous circumstances. In 1951 they moved to the United States, and with the aid of Dr. Henry Townes, himself a world authority on ichneumonid wasps, became American citizens and settled on a little farm in Maine where Gerd and Hildegard have continued to reside and where Gerd, assisted by his wife, has continued his dedicated studies of Ichneumoninae of the world.

Heinrich made a series of expeditions between 1927 and 1963, partly to collect birds and mammals for several European and North American museums, but extensive collections of Ichneumoninae were made on all of these field trips, which included the following: 1927, Northern Persia, Elburs Mountains (provinces of Ghilan, Masanderan, and Astarabad); 1930-1932, Celebes (Latimodjong Mountains, Menkoka Mountains, and Minahasa); 1931, Molucca Islands (Halmahera and Batjan); 1935, southeastern Europe (Balkan and Rhodope Mountains); 1937, Burma (Chin Hills with Mt. Victoria and Shan Plateau); 1952-1953, Mexico; 1953-1955, West Africa: Angola (northeastern and southeastern provinces, Mt. Moco, Mt. Soke); 1957-1958, West Africa: Angola (northern and northwestern provinces); 1961-1963,

East Africa: Tanganyika (Mt. Meru, Usambara Mountains, Uluguru Mountains, Livingston Mountains, Rungwe Mountains, Ufipa Plateau), Northern Rhodesia; 1963, South Africa.

At the age of 81, Gerd continues his studies of Ichneumonidae, studies which began with an early childhood interest in natural history. At the early age of 15, through the influence of Professor Heymons, 1 of the Custodians of Entomology at the Museum fur Naturkunde, this interest became concentrated on parasitic wasps of the family Ichneumonidae, a large, diverse, and at that time taxonomically poorly known group of insects. This lifelong interest has been one of virtually total commitment and dedication.

Howard V. Weems, Jr.
Editor

Bureau of Entomology
Division of Plant Industry
Florida Department of Agriculture and
Consumer Services
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ICHNEUMONINAE OF FLORIDA AND NEIGHBORING STATES

(Hymenoptera: Ichneumonidae, Subfamily Ichneumoninae)

by

Gerd H. Heinrich

Having completed the *Synopsis of the Ichneumoninae of Africa* (Heinrich, 1967-1968), I became interested in the fauna of the southeastern United States, which was poorly known. I decided to work out a comprehensive treatment of the Ichneumoninae of the southeastern states, thus complementing the *Synopsis of the Nearctic Ichneumoninae Stenopneusticae with particular reference to the Northeastern States* (Heinrich, 1961-1962).

The preliminary work of making field studies and collecting material in Florida was begun at the Archbold Biological Station during parts of 1967 and 1968 at personal expense. These first probes into the fauna of the peninsula revealed that a considerable part of the Ichneumoninae, even of this best known of all southeastern states, was as yet unrecorded. At about this time, Dr. Howard V. Weems, Jr., Curator of the Florida State Collection of Arthropods, suggested the possibility of publishing a monographic treatment of the Ichneumoninae of Florida in the series titled *Arthropods of Florida and Neighboring Land Areas*, utilizing the investigations I had already conducted. It was his initiative and encouragement, and his efforts in obtaining financial support which made the writing and publication of this book possible. I am therefore bound in gratitude to him most of all.

At the beginning the scope of the planned publication was geographically limited to the State of Florida. Further extensive collections were made by me in Florida during parts of 1969, 1970, and 1971. As the work proceeded it became clear that the fauna of the peninsula could not be thoroughly understood and evaluated without the inclusion of the fauna characteristic of the adjacent parts of the Austroriparian Zone.¹ Consequently, the scope of this work was broadened, and parts of the years 1970-1972 were used for comprehensive exploration of the Austroriparian lowlands of the neighboring southeastern states, westward

including Georgia. A number of newly found species and older records of species from the Carolinian Zone, from the mountainous, most northern parts of Georgia, Alabama, Tennessee, and Arkansas have been included, but no attempt has been made to explore the fauna of these areas exhaustively.

Extremely valuable was the help given to me through the loans of types or other material by Dr. Henry K. Townes, by Mr. Robert T. Mitchell, and by the curators of the collections of the Smithsonian Institution, the Academy of Natural Sciences, in Philadelphia, the Museo es Instituto di Zoologia Sistemica dell' Universaria di Torino, in Italy, and the Florida State Collection of Arthropods, in Gainesville. I also wish to express my thanks for the kind hospitality which I enjoyed during all my collecting activities in the southeastern states: in Florida particularly to the late Richard Archbold (Archbold Biological Station, Lake Placid), Dr. Edward V. and Roy Komarek (Tall Timbers Research Station), Captain R. Baylor (Highlands Hammock State Park), Dr. Herbert S. Zim (Plantation Key), Dr. Howard V. Weems, Jr. (Red Water Lake and Gainesville), Dieter Radtke (Fort Myers), and Dr. D. O. Wolfenbarger (Homestead); in Louisiana particularly to the Superintendent of Lake Bistineau State Park, L. T. Brown, Jr.; in Arkansas to Superintendent J. V. Ford of Lake Quachita State Park.

Great aid in my work was given to me through the assistance in collecting specimens and/or running insect flight traps for me for considerable periods of time by the following persons: in Florida by Dieter Radtke, Ft. Myers and W. R. Miller, Highlands Hammock State Park; in Georgia by the late Fred Naumann, Forsyth; and Dr. H. and Mrs. Lisa Herman, Athens; in Mississippi by Dr. Clyde Sartor, Starkville and Michael Horan, Water Valley; in Louisiana, Arkansas, and Tennessee by Dwight Shaneck, Bayou Chicot, Louisiana. The efforts of all these dedicated helpers have produced decisive contributions for the now almost exhaustive registration of the southeastern fauna of Ichneumoninae. I express my sincere gratitude to all of them.

Special acknowledgment is due Drs. Robert W. Carlson, Charles C. Porter, and E. Eric

¹See map of "Faunal Zones of America North of Mexico" on the first page of "Hymenoptera of America North of Mexico, Synoptic Catalog," 1951, by C. F. W. Muesebeck, Karl V. Krombein, Henry K. Townes, et al.

Grissell for reviewing the manuscript and offering numerous helpful suggestions, to Dr. Frank W. Mead for verifying names of hosts of Ichneumoninae included in this treatment, to Mrs. Barbara Webb who prepared the color illustrations, to Mrs. Janet C. Williams who typed the final version of the manuscript, and to Harold A. Denmark who provided encouragement and support throughout most of this study. The line drawings were prepared by Erich Diller at the Zoologische Staatssammlung in Munich, Germany, and Miss M. Platek in Ottawa, Canada.

The continuation of the project to its planned conclusion in 1973 was made possible through the greatly appreciated financial support by grants of the Tall Timbers Research Station and by the American Philosophical Society. Financial support for the project was provided by the Florida Department of Agriculture and Consumer Services during parts of 1969-1972.

Last, but not least, I feel bound in gratitude to my wife, Hildegard, who has managed to read and type, with exemplary patience, all of my almost illegible handwritten manuscripts, who has done the 1st editorial work on them and who worked out the general index and the bibliographic index.

This work contains keys for identification and full structural and chromatic descriptions of 50 genera and 135 species and subspecies of the subfamily Ichneumoninae, representing a synopsis of virtually everything known about this group from the States of Florida, Georgia, Mississippi, Louisiana, Arkansas, and Tennessee. Several additional species probably will be discovered in the area covered by this publication during coming decades. I am convinced, however, that the above mentioned number of forms represents the overwhelming majority of the fauna.

Of the 135 forms treated in this publication, 47 previously were not known to science. If, in the entomologically most thoroughly explored eastern part of our country, more than 1/3 of the forms of 1 of the economically most important groups of parasitic Hymenoptera collected was unrecorded and unclassified, it indicates that specialized taxonomy still has a significant place in the spectrum of scientific endeavor.

Zoogeographical and distributional notes

The land area which represents the subject of this publication, is not at all homogenous.

Florida particularly differs markedly, and in more than 1 aspect, from all other states taken under consideration. The characteristic features of the geology, geography, climate, and vegetation of the peninsula have been discussed in detail by C. P. Kimball (1965) in the introduction to the 1st volume of the *Arthropods of Florida and Neighboring Land Areas* and by Dr. Robert E. Woodruff (1973) in the 8th volume of this series. I shall discuss briefly the composition of Florida's Ichneumoninae and relate them to the geographical and climatic peculiarities of the peninsula. Fundamentally we must keep in mind that geologically Florida represents a recent addition to the North American continent, originating from coral reefs long after the lands of North America and Cuba were covered with vegetation and their fauna established. This, however, does not apply to the total territory of the State of Florida: the elevated, northern belt from the Georgia borderline southward to about 60 miles is part of the ancient North American continent, a fact reflected also by the distribution of the Ichneumoninae (discussed below).

All Ichneumoninae are specialized parasites of Lepidoptera. The Ichneumoninae, therefore, could not become established in the geologically new territory of Florida before their hosts, the moths and butterflies, had succeeded in establishing themselves in sufficient numbers and varieties of species. (The Ichneumoninae thus must be considered 1 of the latest groups of immigrants.) The overwhelming majority of their species obviously has immigrated from the north. Only 3 species of Neotropical origin have invaded Florida from Cuba and the Bahamas over the sea (*Carinodes havanensis* (Cameron), *Paraditremops albipectus* (Brullé), and *Neodiphyus flavicornis* (Cresson)); none of these tropical elements was able to expand its range into the ancient, northern part of Florida; on the other hand, 25 species (out of a total of 75 forms recorded below from the entire State of Florida), all representatives of the east American, continental fauna, are found only in northern Florida, but not in Florida's "new territory;" 3 of these species, however, did enter southern Florida early enough to evolve distinguishable, endemic subspecies (*Cratichneumon variegator* Heinrich, *Melanichneumon honestus* (Cresson) subspecies *milleri* (Heinrich), and *Gnamptopelta obsidianator* (Brulle) subspecies *austrina* (Cresson)).

The 75 forms (species and subspecies) in

Florida treated in this paper, can be assigned to 4 distributional groups as follows:

- (1) Endemic forms, known only from Florida 12
(6 of these forms associated as subspecies with east American species).
- (2) Species of confirmed Neotropical origin, confined to central and southern Florida 3
- (3) Species and subspecies occurring only in the continental, northern part of Florida but widely distributed in eastern North America, approximately 25
- (4) Species and subspecies recorded over most of Florida (southward at least to and including Highlands County) and widely distributed also over eastern North America, approximately 35

The range of about 3/4 of the number of species listed under category (3) and 1/2 of the number listed under (4) reaches northward into the northeastern states and into southeastern Canada (in some cases represented there by distinct subspecies); the range of the rest of the species listed under categories (1) and (2) extends only over the neighboring states in the Carolinian and the Austroriparian Zones.

A startling feature of the Florida Ichneumoninae is the small number of forms. The 75 species and subspecies known from this state comprise little more than 1/3 of the approximately 220 forms recorded for New England by Heinrich (1961-1962). It might seem reasonable to assume a causal relation between the scarcity of species and the late appearance of the peninsula of Florida, but I prefer an ecological, particularly climatic explanation. Globally the Ichneumoninae have proliferated in speciation only in moderate and cool climates. In the hot tropical and subtropical belt the number of species is considerable only in the mountains. Starting with moderate numbers from about 1,500 ft. above sea level, the quantity of species increases markedly as the elevation rises to about 6,000 or even to 9,000 ft., according to the presence of suitable vegetation. The tropical lowland jungles are always poorly populated by Ichneumoninae, as is true of all coastal lowlands in the tropical and subtropical belt. Florida is no exception, and it shares the comparatively small number of forms of Ichneumoninae with all neighboring states.

The faunas of Georgia, Alabama, Mississippi, Louisiana, Arkansas, and Tennessee have been included in this publication. In

preparation for the latter, most comprehensive collecting, extended over several years, has been conducted in Georgia, Mississippi, and Louisiana. In Arkansas and Tennessee collecting was limited to 1 season only, but carried out extensively by hand as well as by application of 5 Malaise and Mason traps. The fauna of Alabama, only superficially explored, was restricted to the most northern part of the state.

Most of the territory of the 6 states mentioned above belongs, together with the northernmost part of Florida, to the Austroriparian Zone and is zoogeographically rather homogenous. Only in the extreme northern part of Georgia and Alabama and in northern Tennessee, the range of a number of northeastern American elements projects into the territories of these 3 states, following the most southern spurs and canyons of the Appalachian chains (for example: *Ichneumon versabilis* Cresson and *Ichneumon ambulatorius* Fabricius in Georgia, *Ichneumon tritus* Heinrich and *Aoplus confirmatus* (Cresson) in Tennessee, and *Linycus exhortator thoracicus* (Cresson) and *Spilichneumon provancheri* (Cushman) in Georgia as well as in Tennessee).

One geological factor seems to be especially vital for the Ichneumoninae of all faunal zones: in strong contrast to the aculeate Hymenoptera, almost all Ichneumoninae avoid continuous exposure to direct sunlight. With the exception of a few species especially adapted to open country (in the southeastern states only *Trogomorpha trogiformis* (Cresson) and *Limonetha maura-tor* (Brullé)) the great majority of Ichneumoninae is confined to the shade and shelter of wooded areas. In the lowlands of Florida and the neighboring states of the Austroriparian Zone, forests are restricted for the most part to a limited number of relatively small state parks and reservations, except for the more extensive but botanically monotonous semi-open stands of pines. This is probably another factor responsible for the restricted number of species of Ichneumoninae. Some species may have been lost through destruction of many of the hammocks and mixed forests throughout the southeastern states.

The composition of tribes and genera occurring in Florida and neighboring states shows certain characteristics worth mentioning and discussing. Particularly striking in this connection is the almost complete absence of the Platylabini and of the genera *Ichneumon* Linnaeus, *Stenichneumon* Thomson, *Patrocloides* Heinrich, *Thyrateles*

Perkins, *Hoplismenus* Gravenhorst, *Diphyus* Kriechbaumer, and *Aoplus* Tischbein, all of the tribe Ichneumonini.

The tribe Platylabini, a group specialized as parasites of Geometridae, is represented by many species in the northeastern states. As Kimball (1965) listed more than 250 species of Geometridae from Florida, certainly no lack of hosts has prevented the Platylabini from invading the southeastern states. Here, too, the climate very likely was the decisive limiting factor. This hypothesis is supported by observations made on tropical mountains (in equatorial Celebes, Africa, and elsewhere) where *Platylabus* species were found only from 3,500 ft. up to about 9,000 ft.

The absence of the genera of Ichneumonini mentioned above, has another reason. The species of all these genera are specialized for a life cycle including hibernation of the fertilized female during a cold to very cold winter season. There are 67 species of the genus *Ichneumon* alone recorded for New England by Heinrich (1961), but only 1 of them and 1 endemic species have been found in Florida and 2 other species in the Austroriparian parts of Mississippi and Louisiana. In the above-mentioned genera of Ichneumonini as well as in the Platylabini (although the latter do not hibernate as adults), the high degree of adaptation to cold latitudes appears to preclude survival in hot, subtropical regions. Characteristically the only species of the genus *Ichneumon* I found in Celebes (at the Equator) lived at the summit of Mt. Latimodjong at about 10,000 ft. It would be interesting to learn more about the life cycle, host, and general biology of the only *Ichneumon* species endemic in Florida. On the other hand, only a group with nonhibernating females, the genus *Barichneumon* Thomson, shows a higher degree of speciation in Florida and the neighboring states than in the cool northeastern climate.

In summary, with particular reference to the tribe Platylabini, I conclude that, at least in the Ichneumoninae, the presence of host species is not the only decisive ecological factor but that the climate and biotope are apparently of equal, if not greater, importance.

Biological Notes

All known Ichneumoninae are parasites of Lepidoptera. The female deposits a single egg in the body of the host, either in the larva or pupa. Recent unpublished research by Rolf Hinz in Germany revealed that species with

oxypygous² females parasitize the pupa, amblypygous³ species the caterpillar. Exceptions to this rule are not known to me, but they may exist. In the Holarctic Zone, the hibernating species usually produce only 1 generation per year, the nonhibernating species often 2. In Florida, the periodically fluctuating populations of many species (all of nonhibernating genera) suggest that 2 or more generations are the rule.

During 1967-1969, I visited Florida in all months of the year collecting Ichneumoninae methodically by hand and in traps in order to gain an understanding of the seasonal distribution of these insects. These, briefly, are the results: Ichneumoninae fly actively from April through November in central Florida. From December through March a few specimens have been seen or caught. Nearly all were 3 common species (*Cratichneumon floridensis* Heinrich, *Melanichneumon heiligbrodti* (Cresson), and *Barichneumon peramoenus calliandros* Heinrich). I suspected that further south insect life would start earlier than in central Florida. I spent the last half of March 1968 on the Florida Keys, running 3 traps on Key Largo and collecting by hand net on Plantation Key and Big Pine Key. I was unable to collect even 1 specimen of Ichneumoninae during this time. Returning to Lee County, I found that the season had just started there with the appearance of 2 small *Barichneumon* species. Within a few days the numbers of the species and individuals increased rapidly and remained at the maximum level of the year from mid-April to about mid-July. This agreed with observations of the previous year and probably can be considered the norm. During July, the numbers of species and individuals apparently drop markedly, increasing once more from late July to November, although the 2nd generation does not reach the volume of the 1st.

As the Ichneumoninae differ considerably from the aculeate Hymenoptera in their ecological requirements and seasonal appearance, so they also follow a distinct daily schedule of their own. In consequence of their

² and ³ The terms "oxypygous" and "amblypygous" refer to the end of the abdomen of the female, "oxypygous" describing a pointed structure with a short hypopygium, not covering the ovipositor ventrally (the latter often slightly projecting); "amblypygous" refers to a bluntly rounded end of the abdomen of the female, with long hypopygium, covering the entire ovipositor ventrally.

apparent general intolerance of great heat and intense sunlight, they nearly disappear from sight on sunny days during the middle of the day. During a drought period in 1968, which began in late April and lasted for several weeks, Ichneumoninae could only be seen between 7:30 and 10:30 a.m., with the peak of flight between 8:00 and 9:00 a.m. After 10:30 a.m., when many Aculeata were around in great numbers, Ichneumoninae had disappeared completely. Only late in the afternoon between 5 and 6 o'clock did they make a second appearance. This schedule or a similar 1 applies to all hot regions, and it is 1 of the many reasons why Ichneumoninae had been so poorly collected and investigated before the Malaise trap came into use.

Adult Ichneumoninae feed on honey dew secreted by scales and aphids on foliage of certain plants. They also visit the blossoms of several species of umbelliferous plants, particularly species of the genera *Sium*, *Peucedanum*, *Heracleum*, and *Daucus*. In Florida, I have seen very few of these Umbelliferae and never Ichneumoninae on them, although they were visited by great numbers of Aculeata. I once found a particular group of cabbage palms, *Sabal palmetto* (Walter) Loddiges, in blossom, which attracted a number of the most interesting Ichneumoninae for several days, but only during the hours mentioned in the previous paragraph. The greatest concentration of Ichneumoninae I ever found in Florida was attracted, day after day for a few weeks, by a large stand of bryophyllum, *Kalanchoe pinnata* Persoon, in a forest relict near Ft. Myers.

Certain young and small magnolia trees, with blackish or greyish discolored leaves, have great attraction for Ichneumoninae in Florida. Probably the discoloration is sooty mold growing on honey dew. Not all leaves with such symptoms attract Ichneumoninae, however. Those which do usually are indicated by visiting Diptera or various Hymenoptera, particularly ants. It is worthwhile to wait at such a tree for 1/2 hour or longer, as often there is a continual arrival at short intervals of a variety of species. Also a carpet of wild grapevines occasionally may be infested by aphids and may be attractive to Ichneumoninae. To be visited by Ichneumoninae, such places must be situated in shade or partial shade of large trees; if they are fully exposed to sunshine, only Aculeata will be attracted in numbers or occasionally a *Limonethe maurator* (Brullé) or a *Trogomorpha trogiformis* (Cresson).

Sexual Dimorphism and Dichromatism

In the Ichneumoninae sexual differences are extraordinarily great in morphology as well as in coloration. As the Greek word "morph-" refers to the shape only and not to the color, the term sexual dimorphism will be reserved for structural differences while sexual dichromatism will be used only for differences in color.

Sexual dimorphism—Sexual dimorphism affects almost every part of the body and follows certain general rules in most Ichneumoninae tribes. It shows a high degree of development throughout the subfamily, so that practically no structural features are ever exactly congruent in both sexes.

Among the morphological characters used in taxonomy of Ichneumoninae, the structure of gastrocoeli and of the mandibles varies the least between sexes, the shape of the flagella, scutellum, propodeum, and the head vary most.

The flagella are constructed completely differently in the sexes. The female flagellum usually is flattened ventrally beyond the middle and more or less widened; neither of these 2 features occurs in the male. Instead, the male flagellum usually is distinctly nodose, and specifically varying numbers of flagellar segments bear tyloids, protrusions of so far unexplained function, which vary in size and shape for different species.

The scutellum usually is somewhat more raised above the postscutellum in males than in females; the propodeum is, as a rule, shorter in males than in females with the consequence that the area superomedia also is shorter in males than in females.

The abdomen of females usually is shorter, wider, and more oval shaped than in males.

The legs usually are more slender than in males.

The heads of females may be characterized by wider temples and cheeks, an adaptive character usually connected with the parasitization of stem-boring larvae or their pupae, and consequently usually more developed in females than in males.

Sexual dichromatism—Sexual dichromatism is evident in nearly all species of the subfamily, but is most strikingly developed in the tribe Ichneumonini, and with reference to the fauna of Florida, particularly in the genera *Ichneumon* Linnaeus, *Cratichneumon* Thomson, *Barichneumon* Thomson, and *Melanichneumon* Thomson. Like sexual dimorphism, dichromatism also follows certain rules: white or yellow patterns tend to

be more extensive in males than in females and are sometimes even subobsolete or absent in associated females except on the abdomen, where white anal markings often are more restricted in males than in females. The white or yellow bands on the anterior abdominal tergites tend to be more extensive in males than in females, or to be altogether absent in females associated with heavily banded males (genus *Ichneumon*). In the latter genus often little or no similarity is apparent between the sexes of the same species.

In groups with highly developed sexual dimorphism and dichromatism, the correct association of sexes often is extremely difficult or even impossible, particularly where several closely related species occur in the same region. Under such circumstances associations remain hypothetical and can only be proven by raising the 2 sexes in captivity from the same host, by raising from the eggs of 1 female, or by making field observations over many years. Until this is achieved, a dual nomenclature for females and males cannot be avoided completely.

Terminology

The terminology used in this publication is discussed in Heinrich (1961:6-9; 1967-1968:8-13). In case of doubt either work may be consulted. (See fig. a, b for diagrams showing morphology of the head and c, d showing morphology of the propodeum and a lateral view of the thorax.) Three minor additional items are explained here, as follows:

In the terms "vertical marks" or "vertical orbits," repeatedly used in the description of species, the word "vertical" is not meant in contrast to "horizontal" but refers to the situation of these marks or orbits on the vertex.

The plural "scutella" is used in reference to scutellum and postscutellum together.

In descriptions of wing venation, the term "radius" refers only to the exterior section, from areolet to anterior border of wing. This is equal to section L-F in Townes (1969:42).

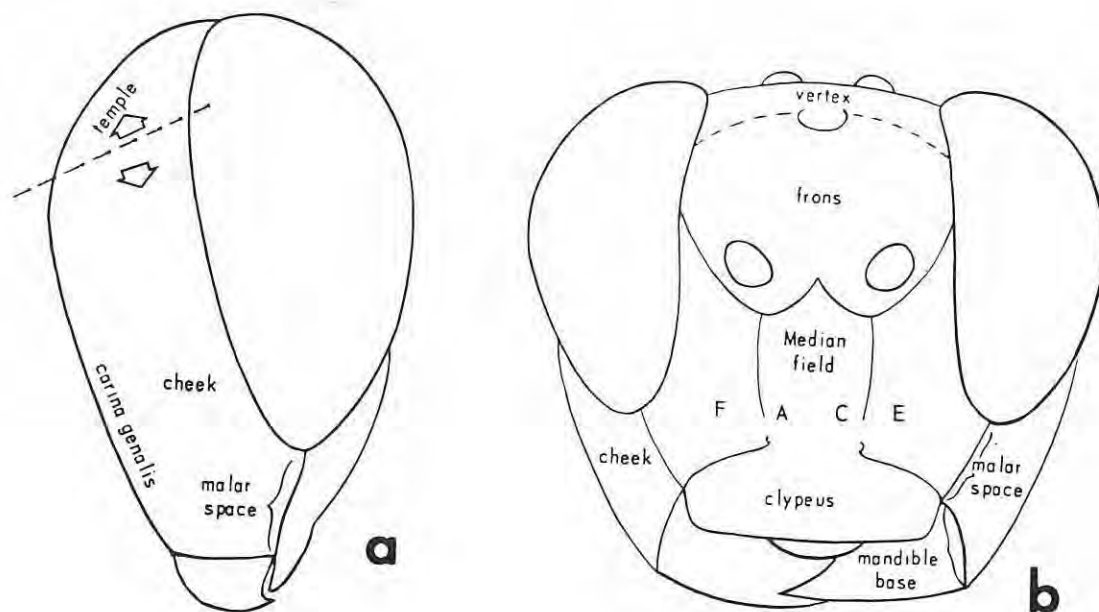


Fig. a & b. Morphology of head.

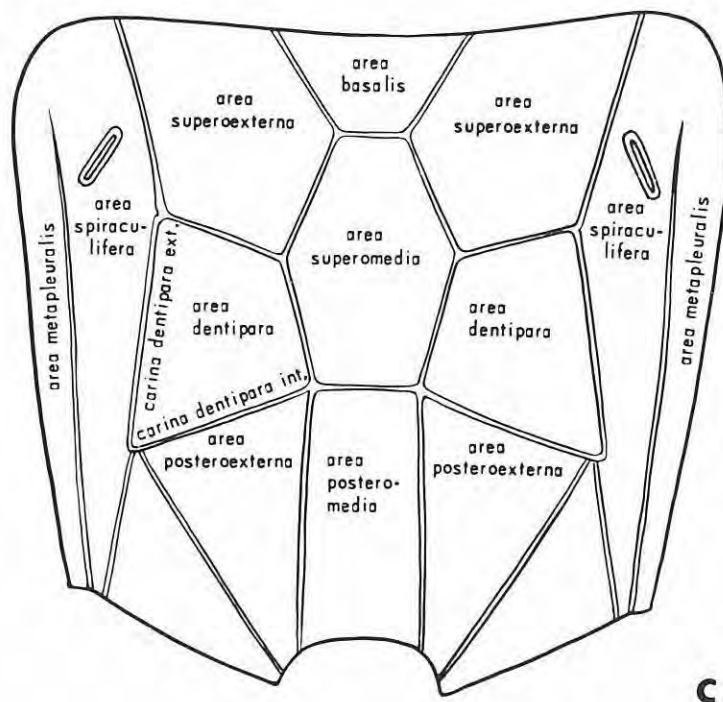


Fig. c. Morphology of propodeum.

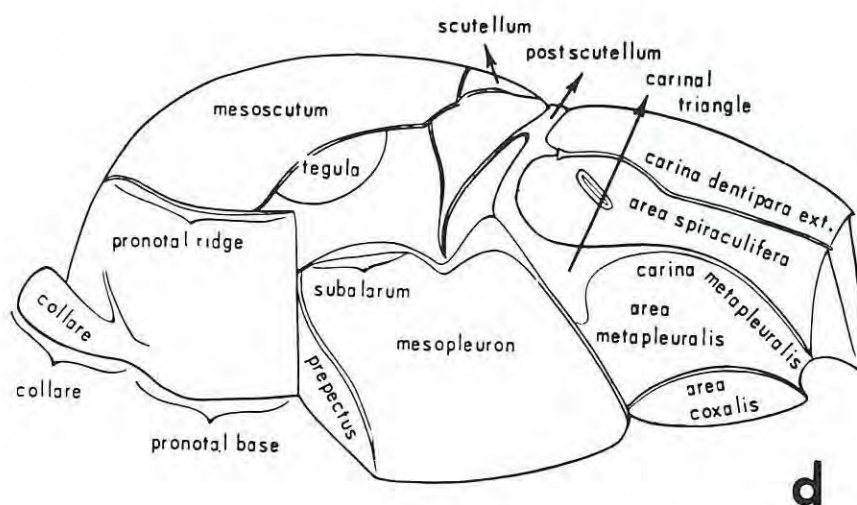


Fig. d. Morphology of thorax, lateral view.

A term "neallotype" is used in this and the author's former publications; the term is not internationally introduced. It is applied to the specimen on which the 1st description of the other sex of a species is based; it concerns a species already named and described, but known in one sex only. In a group of insects of such high degree of sexual dimorphism and dichromatism as the Ichneumoninae, where the associated sexes often do not show even a slight similarity, a taxonomic term for the type, chosen and designated for the representation of a newly discovered and described sex, seems necessary.

Quotations

No attempt has been made to compile a complete catalogue of all printed references to each taxonomic unit treated in this publication. The treatment of every tribe, genus, species, and subspecies is introduced by a selection of quotations, all chosen by the following guide line: (1) original description; (2) synonymizations; (3) alterations of the generic positions of species; (4) descriptions of the other sex; (5) amendations or complementations of descriptions.

As a rule, for all genera, species, and subspecies, 2 fundamental publications are quoted: Townes and Townes (1951) and Heinrich (1961, 1962). For the tribe Phaeogenini, which was not included in Heinrich (1961, 1962), a 3rd publication is consistently quoted: Townes (1944). This catalog has compiled all quotations until 1944, while Townes and Townes (1951) contains selected quotations only.

COLLECTIONS

- ABS** —Archbold Biological Station, Lake Placid, Highlands Co., Florida
- ANS** —Academy of Natural Sciences, Philadelphia, Pennsylvania.
- BM(NH)** —British Museum (Natural History).
- CGH II.** —Second Collection Gerd Heinrich, Dryden, Maine.
- CHT** —Collection Henry Townes, Ann Arbor, Michigan.
- CNC** —Canadian National Collection, Ottawa, Canada.
- DBUL** —Department de Biologie, Faculte des Siences, Universite Laval, Quebec.
- EUM** —Emory University Museum, Atlanta, Georgia.
- FSCA** —Florida State Collection of Arthropods, Gainesville, Florida.
- LACM** —Los Angeles County Museum, Los Angeles, California.
- MCZ** —Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.
- MNHN** —Musée National d'Histoire Naturelle, Paris, France.
- PMQ** —Provincial Museum Quebec, Quebec, Canada.
- UGA** —University of Georgia, Athens, Georgia.
- USNM** —(United States) National Museum of Natural History, Washington, D.C.

SYSTEMATIC ACCOUNT

Key to tribes of Ichneumoninae of Florida and Neighboring States

1. Propodeum abbreviated, with a smooth culminating boss or arch and steeply declivous before and beyond the culminating point; areolet large, obliquely trapezoidal, with prolonged 2nd intercubitus and abbreviated 2nd abscissa of cubitus; scutellum usually strongly gibbose or pyramidal. (Medium sized to very large forms)
.. VI. Tribe Trogini (Foerster) (p.283)
- Propodeum without culminating boss or arch; areolet pentagonal or rhomboidal; scutellum flat to moderately convex2
2. Spiracles of propodeum circular and very small. (Small to very small forms)3
- Spiracles of propodeum not circular, usually fairly large and elongate, slit shaped, sometimes small but oval4
3. Scutellum with complete and strongly developed lateral carinae; abdomen of females amblypygous; coxae III of females never with protruding elevation on ventral side; petiole often wider than high. (Flagellum of females always long and slender)
..... V. Tribe Platylabini
Berthoumieu (partim.)
(p.272)
- Scutellum laterally not or incompletely carinate; abdomen of females oxypygous; coxae III of females often with short protruding carina or other elevation on ventral side; petiole never wider than high. (Flagellum of females usually short, only exceptionally long and slender)
..... VII Tribe Phaeogenini
(Foerster) (p.298)
4. Petiole wider than high; clypeus distinctly convex. (Abdomen of females amblypygous; scutellum raised and laterally carinate; flagellum of females always long, slender and bristle shaped)
..... V. Tribe Platylabini
Berthoumieu (p.272)
- Petiole not wider than high; clypeus not distinctly convex5
5. Mandibles of sickle-shaped appearance: curved, with long, sharply pointed apical tooth, the short, subapical tooth hidden in vertical view, bent out of the normal, horizontal level with the apical tooth, and instead situated in a nearly vertical plane with it; clypeus apically leaf-like thinned, its apical margin either medially projecting or broadly curved, its base usually slightly convex
..... III. Tribe Joppocryptini
(Viereck)(p. 268)
- Mandibles and clypeus of different structure.....6
6. Face, clypeus, and malar space together forming a continuous, slightly convex plane, without sutures, elevations or depressions; mandibles short and wide, with a deep gap between sub-equal teeth
..... IV. Tribe Listrodromini
(Foerster) (p. 270)
- Face, clypeus and malar space do not form a continuous, slightly convex plane, or if they nearly do, mandibles differently shaped7
7. Areae dentiparae curving down gradually, usually close to the base of coxae III, their apices not at all projecting but flush with the surface of the slope. (Gastrocoeli large and deep, with pronounced thyridia; postpetiole usually aciculate, sometimes punctate; medium-sized to large species)
..... I. Tribe Protichneumonini
Heinrich (p. 10)
- Propodeum of the broken type, with a differentiated horizontal part and declivity; the apices of areae dentiparae usually, though not always, forming sharp corners. (Gastrocoeli varying from fairly deep and large with distinct thyridia to obsolete; postpetiole aciculate or punctured, or irregularly rugose, or smooth; rarely very large, usually medium-sized, often small species)
..... II Tribe Ichneumonini
Ashmead (p. 57)

I. Tribe Protichneumonini Heinrich

Protichneumonini Heinrich, 1934:64, 84

Type genus: *Protichneumon* Thomson

The structure of the propodeum distinguishes this tribe from the Ichneumonini. The propodeum is somewhat abbreviated and apically rounded, the areae dentiparae

sloping down toward the base of coxae III in a more or less steeply arched curve, their apices never forming apophyses or even slight projections; the area superomedia shows a tendency to be narrowed toward area basalis, sometimes forming a Gothic or Roman arch, or approximately a horseshoe shape, often not clearly limited in front and confluent with area basalis. Additional characters are: deep gastrocoeli with distinct thyridia, coarse or (usually) striate sculpture of median field of postpetiole and interspace of gastrocoeli, and pentagonal areolet.

DISTRIBUTION: Worldwide. Only 3 genera of this tribe occur in the Nearctic Zone, 2 of them, *Protichneumon* Thomson and *Coelichneumon* Thomson in Florida and neighboring land areas represented by a fair number of species.

1. Genus *Protichneumon* Thomson

Fig. 1-11

Protichneumon Thomson, 1893:1899. Townes and Townes, 1951:304 (1 Nearctic species). Heinrich, 1961:22 (3 Nearctic species). Townes, et al., 1965:530, 601.

(*Metopichneumon* Uchida as synonym; 9 eastern Palearctic species). Heinrich 1966: 184-185 (treatment of genus; 2 species from Burma).

Type species: *Ichneumon fusorius* Linnaeus; designated by Ashmead, 1900.

SYSTEMATICS: Morphologically the genus *Protichneumon* Thomson is extremely close to *Coelichneumon* Thomson. The structure of the propodeum exhibits the only tangible difference between the 2 genera, inasmuch as the basal furrow is more pronounced and the anterior part of the area superomedia is slightly raised above the areae superoexternae, which slant down somewhat toward the sides, and at the same time toward the basal furrow of propodeum. In this character *Protichneumon* approaches the Oriental genus *Aglaojoppa* Cameron which is distinguished by strikingly different color pattern, by head structure, and by smaller size. It is indeed the extraordinary size of *Protichneumon* species which separates them at 1st glance from the bulk of *Coelichneumon* and *Aglaojoppa* species, a character, in this particular case, not without taxonomic importance, as it is the consequence of a biological peculiarity of this group: its specialization on Sphingidae as hosts.

In a parallel to the metallic-blue group of species of the closely related genus *Coelichneumon* we are in *Protichneumon* confronted with a number of forms of practically congruent coloration, distinguishable only by subtle structural differences. For the specific distinction of the females the proportions of the basal flagellar segments, the structure of temples and cheeks, and the shape of femora III offer useful differential characters. Males are, as usually, more difficult to distinguish than females. The structure of their temples and cheeks is only slightly, if at all, differentiated, and specific differences in the shape of femora III are much less distinct than in females. This leaves the shape and number of tyloids as the relatively best specific character, though also only of restricted value.

The taxonomic difficulty of this genus is aggravated by geographical, and in some cases also by slight individual variability in structure. A group of species of such complexity hardly can be classified specifically and subspecifically to full satisfaction by the morphological approach alone, particularly with regard to the association of sexes. Unfortunately next to nothing is known about the biology of the Nearctic *Protichneumon* species. I hope that my attempt to reclassify this interesting group will, in spite of the merely morphological approach, advance our knowledge of this genus. I am, however, aware of the fact that it has not yet achieved a complete and definite solution of all problems involved. (See in this connection also preamble to the species *grandis*.)

Townes and Townes (1951) listed only 1 species of this genus for North America, *grandis* (Brullé), with 2 synonyms: *regnatric* (Cresson) and *ambiguus* (Cresson). Ten years later I added 2 further Nearctic species and 1 subspecies to the genus, and at the same time I retrieved *regnatric* (Cresson) from synonymy and gave it subspecific status (Heinrich, 1961). Recent research on the fauna of Florida and the neighboring states has revealed that these additions still were not sufficient. It became evident that Florida was inhabited by at least 2 different (though very similar) sympatric species of the genus *Protichneumon*, and 2 further new species were found in the neighboring states; obviously this was a group of much greater diversity of forms (concealed by their almost complete chromatic uniformity) and of greater complexity than so far anticipated. The following revision of the Nearctic species of the genus was a necessary consequence.

The revision has been based on material from the USNM, CHT, FSCA, CGH II, CNC, and LACM (altogether approximately 300 specimens); all types involved have been reexamined.

The following summary report on the basic facts I found and on the conclusions I drew may precede the descriptions of the species involved:

Excluding the species *effigies* Heinrich and *polytropus* Heinrich which are well distinguished by structure or color, the rest of the *Protichneumon* populations inhabiting North America are separable into 2 groups: 1 with strongly sclerotized, very coarsely sculptured, laterally and dorsally more or less distinctly bulging tergites, the other with normally sclerotized, more finely sculptured and not at all bulging tergites (e.g. fig. 5). The former group of populations (so far believed to be represented by 1 species) apparently is confined to the southeastern part of the states from Delaware and West Virginia south to southern Florida and west to Kansas. The latter group inhabits the entire rest of moderate North America from Quebec and Ontario south to about Pennsylvania and from Colorado west to the Pacific coast. So far, I have not seen a single specimen of the "sclerotized" group west of Kansas (Lawrence) and north of New York. This distributional pattern looks, of course, like a paradigm of geographical subspeciation, and this consequently was my 1st concept of the situation, the more so as the occurrence of intergrades, reported from the area where the ranges of southern, highly sclerotized populations meet with those of the northern ones, seemed to support this hypothesis. As the name *grandis* was generally introduced for the normally sclerotized northern form, while the type of *regnatrix* obviously represented the strongly sclerotized southern form, I associated the latter form as a subspecies with the former; this hypothesis turned out to be a double error: 1st from the taxonomic point of view when the examination of the southeastern populations proved the existence of at least 3 highly sclerotized sympatric species, and 2nd it became obsolete also from the point of view of nomenclature, when a recent examination of the lectotype of *grandis* revealed it as an unmistakably highly sclerotized southeastern specimen, a fact excluding the use of this name for the northern, normally sclerotized population.

The revisional treatment of the *Protichneumon* species is based on the following

changes: (1) The holotype of *ambiguus* represents without doubt the northeastern population so far known under the name *grandis*; the former name, therefore, is introduced in replacement of the latter. (2) The name *grandis* is transferred to 1 of the highly sclerotized, southeastern forms. (3) *P. grandis* and *ambiguus* are not considered as subspecies but as distinct species, as the morphological differences between the 2 forms not only in degree of sclerotization and in coarseness of sculpture, but also in structure of head (see fig. 6,9) and of femora III are too considerable to permit the assumption of merely a subspecific differentiation. (4) Two additional strongly sclerotized southeastern forms, *sartoris* and *radtkorum*, have been recognized and treated as distinct new species. (5) The red-legged subspecies *victoriae* Heinrich, originally associated with *grandis* belongs to the group with normally sclerotized tergites; it is now treated as a full species. (6) The status of *regnatrix* remains problematic. As there is no sufficient proof that the type represents a mere mutation of *grandis*, *regnatrix* is tentatively maintained as a species; a southeastern, apparently distinct form, distinguished (like *regnatrix*) by the lack of a scopa, is treated tentatively as a full species and will be described below under the name *glabricoxalis*, new species; the relationship between the 2 forms needs further investigation.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, of moderate length, ventrally flattened beyond middle and more or less, usually considerably, widened, apically strongly attenuated; of males slightly nodose, with inconspicuous subapical bristle ridges on ventral side and with a row of very distinct tyloids.

HEAD: Mandibles strong, fairly wide, the upper tooth not very much longer than the subapical.

THORAX: Mesoscutum moderately convex, anterior part of notauli usually more or less distinct; scutellum flat to moderately convex, laterally not carinate, except sometimes weakly at base; propodeum fairly short, with pronounced basal furrow percurrent from side to side; areae dentiparae rather steeply arching downward toward base of coxae III, the carinae dentiparae exteriores slightly curved outward; area superomedia horseshoe shaped, semi elliptic, or in the shape of a Gothic arch, usually longer than wide, its anterior part more or less distinctly raised above level of adjacent areae superoexternae,

the latter slightly slanting from area superomedia sideways and also toward basal furrow of propodeum; area basalis steeply declivous toward basal furrow; costulae and carinae coxales sometimes indistinct; edge between mesopleura and mesosternum before coxae II slightly emarginate and usually with a small protuberance before emargination.

LEGS: Fairly stout and strong; coxae III of females as a rule with scopa.

WINGS: Nervulus postfurcal; areolet regularly pentagonal, moderately narrowed in front; radius sinuate.

ABDOMEN: Of females oxypygous, postpetiole with clearly defined median field, which is longitudinally striate or striate punctate; gastrocoeli large and deep, with distinct thyridia, their interspace usually narrower than 1 of them and aciculate; the following tergites more or less densely and coarsely sculptured, in southeastern species

more or less distinctly bulging dorsally and laterally.

CHROMATIC CHARACTERS: Abdomen in great majority of Holarctic species entirely or predominantly red in various shades, from dark chestnut-red-brown to light red, usually the 1st segment, in Palearctic species sometimes also some of the posterior tergites, black; head and thorax black without or with restricted white markings in females, usually more extensively white marked in males; legs in Nearctic species usually predominantly black in females, or, more rarely red; in males sometimes extensively white marked.

DISTRIBUTION: The genus is represented by a moderate number of species in the Nearctic and Palearctic Zones, the latter including the high mountains of the Oriental Region; it is lacking in Africa south of the Sahara and also not recorded yet from Central and South America.

HOSTS: Sphingidae (apparently with few exceptions).

Key to the Nearctic species of *Protichneumon* Thomson FEMALES

- | | |
|---|--|
| <p>1. Coxae III without scopa 2</p> <p>— Coxae III with distinct scopa 3</p> <p>2. Tergites 2 and 3 very strongly sclerotized, laterally (particularly the 3rd) distinctly bulging (fig. 7); apex of abdomen clearly oxypygous, the ovipositor distinctly projecting; sculpture of 2nd and, particularly of 3rd tergite markedly coarser and denser, tarsi III less slender and less elongate than in alternative species (Delaware) 8. <i>regnatrrix</i> (Cresson)</p> <p>— Tergites 2 and 3 strongly sclerotized, with straight sides (fig. 5); apex of abdomen blunt, ovipositor almost entirely hidden; sculpture of tergites 2 and particularly of tergite 3 less coarse and dense, tarsi III more elongate and slender than in alternative species (Tennessee) 9. <i>glabricoxalis</i>, new species</p> <p>3. Femora III uniformly deep black 4</p> <p>— Femora III extensively or entirely light red 10</p> | <p>4. Tergites 2-4 particularly strongly sclerotized and particularly densely and coarsely sculptured, separated from each other by pronounced sutures, dorsally convex, laterally often more or less distinctly bulging (fig. 7); color of tergites a dark brown red. (Wings evenly and very deeply infuscated) 5</p> <p>— Tergites 2-4 not particularly strongly sclerotized and not densely and coarsely sculptured, not separated from each other by deep sutures (fig. 5); color of tergites a pale, close to orange-tinged red. (Wings moderately deeply infuscated) 9</p> <p>5. Flagellum shorter and stouter than in the 2 alternative species, the basal segments shorter and a trifle swollen at the extreme apex, the first not quite twice as long as apically wide (fig. 10); femora III stout and rather short (fig. 11). (Scutellum often white marked apically; temple profile and cheek profile slightly or not narrowed behind eyes and toward mandible base respectively) 6</p> |
|---|--|

- Flagellum fairly long and slender, the basal segments more elongate and not at all swollen apically, the first approximately 2.5 times as long as apically wide (fig. 1); femora III markedly more elongate and slender (fig. 2)..... 8
- 6. Scutellum apically more or less extensively white; marks on vertical orbits and the frontal orbits narrowly, white (Length 24-27 mm) (about Maryland and Pennsylvania south to central Florida, Georgia, and Alabama)
..... 3 a. *grandis grandis* (Brullé)
- Scutellum and vertical orbits not white marked 7
- 7. Very large form, 28-29mm long; 5th tergite and mesoscutum denser and coarser punctured than in alternative forms; cheeks and temples slightly swollen (southern Florida, Lee Co.)
..... 3 b. *grandis inornator*, new subspecies
- Smaller forms; 5th tergite and mesoscutum less densely and less coarsely punctured; cheeks and temples not swollen
.. 3 a. *grandis grandis* (Brullé) variations and unclassified specimens of *grandis*-complex)
- 8. Postpetiole uniformly black; coxae III with fairly small scopa, composed by long, not very dense pilosity; cheeks, in lateral view, only slightly convex, cheek profile, in frontal view, straight (fig. 4); much larger than the alternative species, 25-26mm long (Pennsylvania and New York south to central Florida and west to Kansas) 1. *radtkorum* Heinrich
- Postpetiole predominantly or entirely red; coxae III with very large scopa, formed by brush-like complex of evenly trimmed, very dense hair; cheeks, in lateral view, strongly convex, cheek profile, in frontal view, somewhat curved; much smaller than alternative species, 19-20mm long (Georgia, Mississippi, Tennessee, Arkansas)
..... 7. *sartoris* Heinrich
- 9. Flagellum fairly long, slender, and only slightly widened beyond middle, the 1st segment more than twice as long as apically wide, the widest on the flat side only about twice as wide as long; coxae III with large, usually evenly trimmed scopa; postpetiole red; smaller species, 17-20mm long. (Scutellum never white marked) (Transcontinental, from Newfoundland, Ontario, Saskatchewan, Alberta, and British Columbia to Colorado, Kansas, and Arkansas) 4. *effigies* Heinrich
- Flagellum fairly short and stouter, markedly widened beyond middle, the 1st segment slightly less than twice as long as apically wide, the widest, on the flat side, about 3 times as wide as long; coxae III with small, loose scopa; postpetiole black; somewhat larger species, 20-25mm long. (Scutellum often white marked) (Quebec, Ontario, Michigan south to New York, Pennsylvania and Colorado; specimens from Colorado in CHT) 2. *ambiguus* (Cresson)
- 10. Tergites 2-4 strongly sclerotized and coarsely and densely sculptured, separated from each other by pronounced sutures, bulging slightly laterally toward apex. (Length about 20mm) (North Carolina) 6. *polytropus* Heinrich
- Tergites 2-4 normally sclerotized, finely sculptured, neither separated from each other by deep sutures nor laterally bulging. (Length 23-26mm) (Western North America, from Vancouver Island south to California) 5. *victoriae* Heinrich

MALES

- 1. Femora and tibiae III extensively to entirely red. (Postpetiole also red) ... 2
- Femora and tibiae III black. (Postpetiole black, rarely red in part) 3
- 2. Femora and tibiae I and II black, except anterior side of tibiae I white; tergites 2-4 strongly sclerotized and separated by pronounced sutures, coarsely and densely sculptured. (Length 19mm)
..... 6. *polytropus* Heinrich
- Femora and tibiae I and II predominantly red; tergites 2-4 not particularly strongly sclerotized and not separated by pronounced sutures, less coarsely sculptured. (Length 23-26mm)
..... 5. *victoriae* Heinrich
- 3. Postpetiole extensively red; small species, 17-20mm long. (Tergites 2-5 not particularly strongly sclerotized and strongly sculptured; abdomen light red; coxae, pronotal ridge, and scutellum not white marked; clypeus and face sometimes predominantly black)
..... 4. *effigies* Heinrich

- Postpetiole black; larger species, 20-29mm long 4
- 4. Tergites 2-5 not particularly strongly sclerotized, not separated by pronounced sutures, not dorsally convex or laterally bulging, and not extremely densely and coarsely sculptured; color of abdomen, as a rule, light, close to orange-tinged red; wings moderately infuscated. (Coxae, pronotal ridge, and scutellum usually white marked; length 20-25 mm) 2. *ambiguus* (Cresson)
- Tergites 2-5 particularly strongly sclerotized, separated by pronounced sutures, dorsally convex and usually laterally somewhat bulging, very densely and coarsely sculptured; color of abdomen a dark brown red; wings very deeply infuscated. (Length 23-29mm) 5
- 5. Tyloids conspicuous, elliptical and rather wide. (Longest tyloids, on segments about 10-18, reaching from bases to apices of segments; scutellum and pronotal ridge not white marked; tarsi III usually black, sometimes with restricted or indistinct white lines on anterior side; length 25-29mm) 1. *radtkeorum* Heinrich
- Tyloids less conspicuous, much narrower than in alternative species and approaching a lanceolate or elongate-oval shape. (Scutellum and pronotal ridge often white marked) 6
- 6. ¹Thorax uniformly black; tibiae II and femora II black with only a small apical white spot on anterior side; legs III and coxae I and II uniformly black; tyloids narrow, elongate oval, the longest on segments 13-17 almost reaching bases and apices of segments; length 30mm (southern Florida, Lee Co.) 3 b. *grandis inornator*, new subspecies
- Scutellum, often also pronotal ridge, white marked; tibiae and femora II predominantly white on anterior side, tarsi III usually extensively white, coxae I or I and II white marked on ventral side; length 25-28mm 3 a. *grandis grandis* (Brullé)

¹ The couplet of 6 of the above key is provisional. It does not guarantee a sure identification of all specimens leading to it, as it probably also includes the so far unidentified males of *sartoris*, *glabricoxalis* and *regnatrix*.

1. *Protichneumon radtkeorum* Heinrich

Fig. 1-4, Map 1

Protichneumon radtkeorum Heinrich, 1972: 174-175, female/male.

Holotype: female, Fort Myers, Florida, 1-V-1968. CGH II. Allotype: male, same locality, 2-VII-1967. CGH II. Paratypes: 7 females, 52 males, same locality, 2-IV-9-VIII-1967 and 1968. CGH II.

SYSTEMATICS: A large species with dark, chestnut-red abdomen, and with very deeply infuscated wings with purplish reflection. In appearance and size extremely similar to *grandis* Brullé, sharing with that species the very strong sclerotization and coarse and dense sculpture of tergites 2-4. Distinguished in females by the combination of the following 4 characters: (1) basal segments of flagellum (fig. 1) perfectly cylindrical (that is, apically not in the least swollen) and slightly more elongate than in most other species (except *sartoris* Heinrich and *effigies* Heinrich); (2) the widest segment of flagellum on the flat side only somewhat more than twice as wide as long (instead of more than 3 times as wide as long as in *grandis*); (3) femora III (fig. 2) considerably more slender and more elongate than in *grandis* (fig. 11); (4) temple profile markedly narrowed behind eyes, with nearly straight outline (fig. 3). In proportions



Fig. 1. *Protichneumon radtkeorum* Heinrich (female). Flagellum, basal segments.

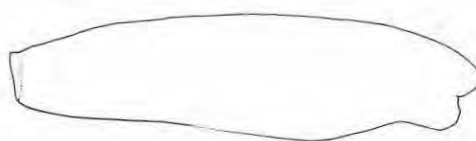


Fig. 2. *Protichneumon radtkeorum* Heinrich (female). Femur III, side view.

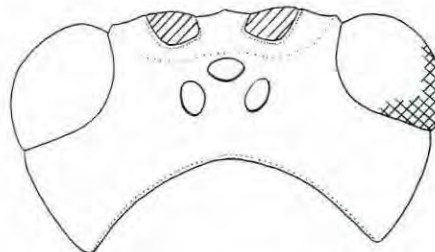


Fig. 3. *Protichneumon radtkeorum* Heinrich (female). Head, dorsal view.

of flagellar segments more similar to *sartoris* and *effigies* than to any other North American species, but strikingly different in appearance from both by almost double their size and besides, by not large and flat trimmed but rather small and inconspicuous scopa.

The isolated occurrence of the species in a small relic of woodland (see type locality) where females and males were collected during the entire season of 1968 in broad series, makes the association of sexes practically indubitable.

The male shows the same dark color as the female, with always entirely black scutellum and usually entirely black legs III; it is distinguished by the tyloids being elliptic, rather long, and somewhat broader than in most other species.

FEMALE: Length 25-26mm. Black, including legs and 1st segment of abdomen; rest of abdomen dark brown red; wings uniformly and very deeply infuscated; white are: anterior side of tibiae I, minute marks on vertical orbits and usually indications of small marks on upper frontal orbits, level with lower ocellus, rarely (in northern specimens) a small mark on upper facial orbits; marks on orbits varying sometimes from white to dull reddish; flagellum black with white annulus usually on segments 7-15, rarely on 6-16; coxae III with scopa.

FLAGELLUM: As described for the genus, moderately widened beyond middle, apically very strongly attenuated and pointed, with usually 47-49, exceptionally only 44, segments; basal segments more elongate than in most other Nearctic species (except *sartoris* and *effigies*), the 1st segment (fig. 1) about 2.5 times as long as wide, in dorsal view the 9th or 10th, in lateral view the 7th square, the widest, seen from the flat side, more than twice as wide as long.

HEAD: Temple profile, in vertical view, slightly more narrowed behind eyes than in *grandis*, cheek profile in frontal view (fig. 4) distinctly more narrowed toward mandible base, lower cheeks slightly less convex; carina occipitalis, in vertical view, showing a narrower and distinctly deeper arch, often nearly forming an angle in the middle.

THORAX: Trough behind collare medially with 1 or 2 longitudinal short rugae; anterior 1/3 of notauli distinct, sternauli obsolete;

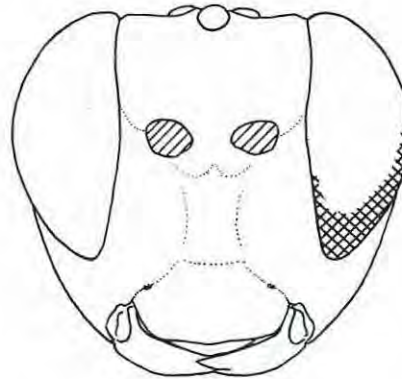


Fig. 4. *Protichneumon radtkorum* Heinrich (female). Head, frontal view.

scutellum more convex and higher raised above postscutellum than in *grandis*, with fairly steep apical slope; area superomedia usually about as long as apically wide, surrounded all around by strongly prominent carinae, approximately horseshoe shaped or narrowed in front almost to a point; area basalis and areae superoexternae steeply sloping down from anterior border of area superomedia; lateral carinae of area posteromedia distinct.

LEGS: Coxae III with fairly small scopa; femora III (fig. 2) not quite as stout and in lateral view longer (compared to the median width) than in the 2 following species (fig. 2, 11).

ABDOMEN: Tergites 2-4, as in the other southeastern forms, very strongly sclerotized and very coarsely and densely sculptured, subopaque, separated from each other by deep sutures (as in fig. 7); the 5th tergite also very densely and fairly coarsely punctured.

MALE: Length 25-29mm. Black, tergite 1 rarely obscure reddish, tergites 2-7 dark brown red; the following always white: face and clypeus, lower part of frontal orbits (from face up to nearly middle of frons) stripe on outer orbits (between temples and malar space), mandibles (except inferior edge black), scape ventrally, small spots on vertical orbits, anterior side of femora I and of apex of femora II, anterior side of tibiae I and II, anterior side of tarsi I and II more or less extensively, apical margins of trochanters I and II and (in majority of specimens) marks on ventral side of coxae II or I and II; for additional, occasional white marks see Table 1 of distribution of white of 54 males; postpetiole rarely obscure reddish

toward apex; flagellum without annulus, but exceptionally with minute white lines on some of the median segments or on inner side of the basal segments; wings uniformly deeply infuscated with purplish reflections.

FLAGELLUM: With 44-46 segments, and with broad, elliptical tyloids on segments 7-22, the longest, on about segments 10-18, reaching from bases to apices of segments.

HEAD: Temple profile slightly more curved than in female; malar space only about 1.3 as long as width of mandible base.

THORAX: Scutellum considerably more raised above postscutellum than in *grandis*, more convex, and more coarsely punctured, laterally weakly carinate to almost middle; area superomedia on the average larger and wider than in female, more raised above level of horizontal part of propodeum; otherwise as in female, including short median rugae in furrow behind collare.

ABDOMEN: Tergites 2-5 very strongly sclerotized and very densely and coarsely sculptured, subopaque, separated from each other by pronounced constrictions; the 6th tergite somewhat less coarsely but also distinctly and very densely punctured, about twice as wide as long; even the 7th tergite wider than long.

DISTRIBUTION (*map 1*): From central Florida north to Virginia and Maryland (CHT), and west to Kansas (CGH II); sporadic records from Pennsylvania (Greensburg) and New York (Ithaca) (CHT) FLORIDA. Ft. Myers, Orange River, Lee Co.: 8 females, 53 males, 2-IV-9-VII-1967 and 1968, G. Heinrich and D. R. Radtke; 2 females, 17-IX-1969, 2 females, 2-XI-1969, 3 females, 25-30-X-1971, 1 female, 20-XI-1971, 2 males, 30-III-1972, all D. Radtke. (All in CGH II); Highlands Hammock State Park, Highlands Co.: 1 female, 2 males, 26-27-IV-1968, G. Heinrich; 5 females, 1 male, 3-VIII-2-IX-1969, D. Radtke. (CGH II); 1 male, Torreya State Park, Liberty Co., 11-V-1968, G. Heinrich. (CGH II); 1 female, Gainesville, 17-IV-1959, H. V. Weems, Jr.; 1 male, Torreya State Park, Liberty Co., 15-V-1964, H. A. Denmark. (Both FSCA) GEORGIA. Forsyth, Monroe Co., 1 female, 9-IX-1969, G. Heinrich; 2 males, 28-V-4-VI-1970, G. Heinrich; 1 male, 1-9-VIII-1970 and 1 male, 10-21-VII-1971, F. Naumann. (All in CGH II). LOUISIANA. 1 female, Powhatan, Natchitoches Co., 11-VI-1971, G. Heinrich. (CGH II)

TABLE 1. Distribution of white on 54 males of *Protichneumon radtkeorum* from Florida

(52 from Ft. Myers,
2 from Highlands Co.)

No. specimens	Distribution of white
54	small marks on vertical orbits
54	narrow stripe on outer orbits
54	frontal orbits up to about middle
54	face and clypeus
54	mandibles extensively or predominantly
54	scape below
54	inner side of femora I except base
54	inner side of apex of femora II
54	inner side of tibiae I
54	outer side of tibiae II
54	dorsal side of tarsi I predominantly (usually except 4th segment)
50	dorsal side of at least segments 1-3 of tarsi II extensively
4	dorsal side of only segments 1-2 of tarsi II extensively
54	apical margin of trochanters narrowly on dorsal side
6	indistinct line on outer side of metatarsus III (brownish or whitish)
3	also anterior side of 2nd segment of tarsi III more or less distinctly whitish
20	exterior side of tibiae III at base only, or more extensively, sometimes predominantly brownish to obscure whitish
6	dot on apex of pronotal ridge
46	mark on ventral side of coxae I
51	mark on ventral side of coxae II
1	spot on apex of scutellum
3	some of the median segments of flagellum dorsally with minute white markings
3	1st flagellar segment white marked on inner side



Map 1. *Protichneumon radtkeorum* Heinrich

2. *Protichneumon ambiguus* (Cresson)

Fig. 5-6

Ichneumon ambiguus Cresson, 1864:161, male.

Protichneumon grandis, Townes and Townes, 1951:304, partim; (*Ichneumon ambiguus* Cresson as synonym). Heinrich, 1961:25, partim; (*Ichneumon ambiguus* Cresson male as synonym).

Holotype: male, Pennsylvania; ANS (no. 1436). Neallotype: female, "Dryden, Maine, U.S.A., 25-VII-52." CGH II.

SYSTEMATICS: The holotype of this species has been reexamined. It represents, without doubt, the northeastern form, the 1 with normal or moderate sclerotization and normal sculpture of tergites. Females of this

form differ from *grandis* (as represented by the lectotype) not only in structure and sculpture of tergites, but also in head structure, proportions of femora III, average size and color: the temple profile and cheek profile (fig. 6) are slightly more narrowed behind eyes and toward mandible base respectively, femora III are more slender, the size is smaller, and in most specimens the color of the abdomen is lighter, slightly orange tinged red. On account of these differences *ambiguus* is treated here as a distinct species, although it seemingly replaces *grandis* Brullé geographically.

The decisive characters of *ambiguus* are the normal sclerotization of tergites and their finer and less dense sculpture (fig. 5), as compared with *radtkeorum* and *grandis* (fig. 7).

FEMALE: Length 20-25 mm. Black, including legs and 1st segment of abdomen; rest of abdomen light, usually close to orange-tinged red; wings uniformly but less strongly infuscated than in *radtkeorum* and *grandis*; scutellum varying from entirely white to entirely black; the following white also: anterior side of tibiae I, often also apex of femora I, usually marks on anterior sides of segments 1 or 1 and 2 of tarsi I, facial orbits narrowly, usually also small vertical marks, often a mark on upper part of facial orbits,

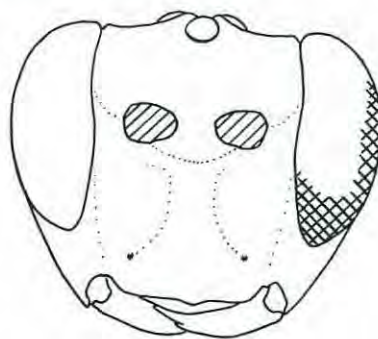


Fig. 6. *Protichneumon ambiguus* (Cresson) (female). Head, frontal view.

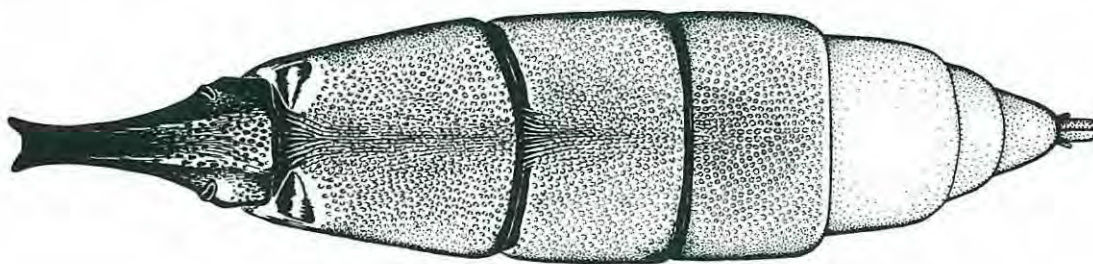


Fig. 5. *Protichneumon ambiguus* (Cresson) (female). Abdomen, dorsal view.

and apical margin of 1st trochanters I; flagellum with dorsal white annulus on segments 6 or (usually) 7 or (rarely) 8 to 13 or (usually) 14 or 15 or 16.

FLAGELLUM: Bristle shaped, fairly short, ventrally flattened and strongly widened beyond middle, apically strongly attenuated and pointed, with 48-53 segments, the 1st nearly twice as long as apically wide, in lateral view the 6th square, seen from the flat side the widest about 3 times as wide as long.

MALE: Length 20-25 mm. Black, tergites 2-7 light red; the following white: face, clypeus, frontal orbits up to level with lower ocellus, vertical marks, stripe on outer orbits (between temple region and malar space), mandibles (except inferior edge black), scape ventrally, usually mark on collare, mark on subalarum, and apical part of pronotal ridge, sometimes entire length of pronotal ridge, usually scutellum apically to entirely, rarely mark on exterior part of prepectus, sometimes mark on tegulae, coxae I and II ventrally more or less extensively, femora I on ventral side, femora II on ventral side except basally, ventral side of tibiae I and II, all tarsi extensively to entirely, apical margin of 1st trochanters I, and rarely mark on trochanters II.

FLAGELLUM: With 46-50 segments and with broadly-oval, fairly short tyloids on segments 6 or 7 or 8 to 20 or 21, those on about segments 12-19 reaching from bases to apices of segments. The shape of tyloids seems to be somewhat variable, but is on the average shorter in relation to its width as in *radtkorum*.

DISTRIBUTION: From Quebec, Ontario, and Michigan south to New York, Pennsylvania, and Colorado (specimens from Colorado in CHT).

**3a. *Protichneumon grandis*
grandis (Brullé)
Fig. 7-11, Map 2**

Ichneumon grandis Brullé, 1846:300, female (published type locality: Philadelphia, Pennsylvania)

Protichneumon grandis, Townes and Townes, 1951:304, partim.

Lectotype: female, without locality label; Museo ed Istituto di Zoologia Sistemática della Università di Torino (in collection Spinola), Torino, Italy; designated by Townes (1961:108) Neallotype: male, Archbold Biological Station, Lake Placid, Florida, 11-V-1967. CGH II.

SYSTEMATICS: The lectotype of *grandis* was sent to me from Turin for examination by courtesy of professor Umberto Parenti. I express here my appreciation for this decisive support of my work.

The examination of the lectotype has proven that the name *grandis* has to be applied to 1 of the southeastern forms with strongly sclerotized and coarsely and densely sculptured tergites (fig. 7), with short femora III, with rather broad temples and cheeks, and with dark, brown-red abdomen. The lectotype displays the following white marks: apical half of scutellum, mark on apex of pronotal ridge, small vertical marks and narrow line on frontal orbits.

The holotype of *Ichneumon regnatrix* also has been reexamined; no tangible structural difference has been found between *regnatrix* and *grandis*, except for the complete lack of a scopa in the former; see also treatment of *regnatrix*.

The classification of the southeastern, strongly sclerotized forms of the genus *Protichneumon* represents 1 of the most difficult problems of North American ichneumonology. Females and males of the recently distinguished species, *radtkorum* and females of *sartoris* are rather easily identifiable. The remaining populations (distinguished by a scopa on coxae III) are not homogenous enough to establish convincingly the image of only 1 specific unit; on the other hand, their structural distinctions are too subtle to permit, at this point, a specific division.

There is 1 marked chromatic differentiation splitting the females of the *grandis* complex into 2 categories: (a) specimens sharing with the holotype the white apex of scutellum, white vertical marks and white lines on frontal orbits; (b) specimens without all these white markings. At the present time I consider the identity of the species *grandis* as fully established only for the former category. The records given below for *grandis* are based, therefore, only on specimens displaying the white pattern of the holotype. The specific identity of specimens of the 2nd category remains uncertain; some of them represent most likely only individual variations of *grandis*, others geographical subspecies or perhaps even distinct species.

Six females from Florida, Lee Co., which all lack the white markings of the *grandis* type and also show some additional, though subtle, differences from the latter are tentatively treated below as representatives of a geographical new subspecies of *grandis*.

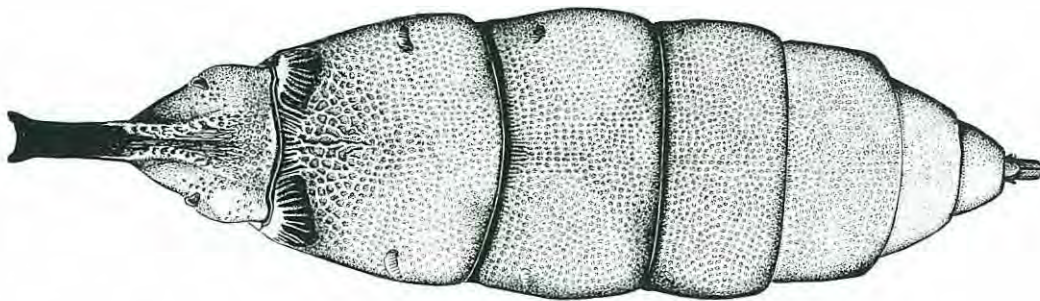


Fig. 7. *Protichneumon grandis grandis* Brullé (female). Abdomen, dorsal view.

This hypothesis is supported by the fact that typical white-marked specimens of *grandis* have not been found so far in Lee Co. but are common further north in Highlands Co.

Two other females, from Mississippi, also belonging apparently to the *grandis* complex and also lacking the white pattern of the *grandis* type, are considerably smaller than the specimens from Lee Co. mentioned above and have exactly the same head structure and sculpture as *grandis*; they are considered to be, in all probability, individual variations of the typical form and are provisionally included in its distributional records.

FEMALE: Length 24-27 mm. Black, including legs and 1st segment of abdomen (the latter exceptionally obscurely reddish in part); rest of abdomen dark brown red; postpetiole sometimes apically to entirely obscure red; wings uniformly and very deeply infuscated; white are only: anterior side of tibiae I, usually minute marks on vertical orbits, a narrow line on frontal orbits, and (in type and most specimens) apex or apical 1/2 of scutellum; often also white mark on apex of pronotal ridge; flagellum with white annulus on segments 6 or (usually) 7 or 8 to 14 or (usually) 15 or 16; coxae III with scopa.

FLAGELLUM (fig. 10): Bristle shaped, fairly short, ventrally flattened and strongly widened beyond middle, apically strongly attenuated and pointed, with 50-53 segments, the 1st less than twice as long as apically wide, in lateral view the 7th: square, the widest, seen on the flat side, about 3 times as wide as long.

HEAD: Temple profile (fig. 8) in vertical view slightly or scarcely narrowed behind eyes and slightly curved, always less narrowed than in *radtkeorum*; cheek profile (fig. 9) in frontal view likewise only slightly or scarcely narrowed toward mandible base; lower cheeks moderately convex; carina

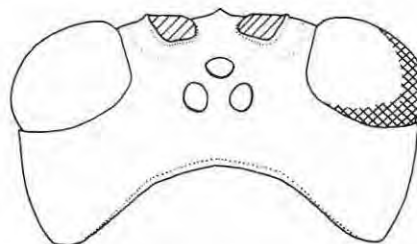


Fig. 8. *Protichneumon grandis grandis* Brullé (female). Head, dorsal view.

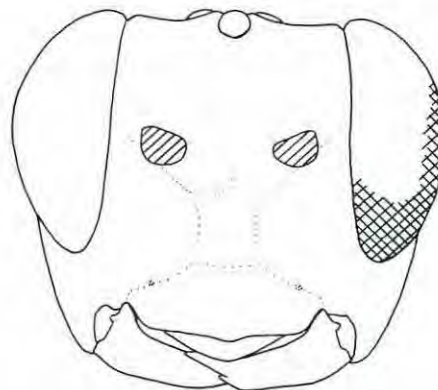


Fig. 9. *Protichneumon grandis grandis* Brullé (female). Head, frontal view.

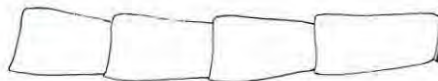


Fig. 10. *Protichneumon grandis grandis* Brullé (female). Flagellum, basal segments.

occipitalis in vertical view forming a broad arch of moderate depth.

THORAX: Trough behind collare medially without distinct rugosity; anterior 1/3 of notauli distinct; sternauli obsolete; scutellum

slightly to moderately convex, gradually slanting toward postscutellum; area supero-media narrow, usually longer than wide, gradually narrowed in front (sometimes forming a Gothic arch) and not clearly delimited apically by a carina; lateral carinae of area posteromedia also indistinct; areae superoexternae and basalis more gently sloping downward from anterior border of area superomedia than in *radtkeorum*.

LEGS: Fairly stout, femora III (fig. 11) considerably shorter and thicker than in *radtkeorum*, slightly thicker than in *ambiguus* also; coxae III with scopa.

ABDOMEN: (fig. 7) Tergites 2-4, as in *radtkeorum*, very strongly sclerotized and very coarsely and densely sculptured, subopaque or opaque, the 3rd tergite separated by pronounced sutures from the 2nd and from the 4th tergite.

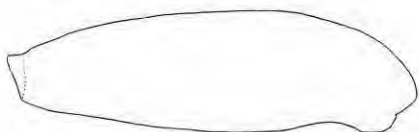


Fig. 11. *Protichneumon grandis grandis* Brullé (female). Femur III, lateral view.

MALE: (Description based on specimens from Florida); at once distinguishable from males of *radtkeorum* by white markings on scutellum, pronotal ridge, subalarum, and sometimes on collare and by white tarsi I and II, the tarsi III sometimes also being extensively white marked; temple profile more strongly narrowed behind eyes, tyloids on the average narrower. White marks on thorax variable (table 2) and perhaps sometimes lacking; such melanistic specimens are difficult to distinguish from *radtkeorum*. Length 26-28 mm. Black, tergites 2-7 brown red, the following white: clypeus, face, scape ventrally, mandibles (except teeth and inferior margin) frontal orbits (up to level with lower ocellus), vertical marks, stripe on outer orbits (between temples and malar space), apex or entire length or pronotal ridge, sometimes mark on collare, almost always on subalarum, sometimes mark on tegulae, scutellum apically to predominantly (except base), usually marks on ventral side of coxae I and II, apical margin of 1st trochanters I, sometimes mark on ventral side of 1st trochanters II, entire anterior side of tibiae I and II, anterior side of

TABLE 2. Distribution of white color on 15 males of *Protichneumon grandis* (Brullé) from Highlands Co. (14 males from Highlands Hammock State Park)

No. specimens	Distribution of white
13	Face and clypeus uniformly
2	face and clypeus except black median mark on the former
15	narrow stripe of variable length on outer orbits
15	frontal orbits up to lower ocellus
15	small marks on vertical orbits
15	mandibles except inferior side
15	scape ventrally
11	pronotal ridge from tegulae to middle or beyond
4	pronotal ridge only apically
7	subalarum predominantly
8	subalarum only medially
4	restricted mark on collare
5	scutellum predominantly (except base)
10	scutellum apically only (more or less extensively)
15	femora I ventally at apex more or less extensively
15	femora II ventrally at apex more or less extensively
12	more or less extensive mark on ventral side of coxae II
5	more or less extensive mark on ventral side of coxae II
15	apical margin of 1st trochanters I
5	mark on 1st trochanters II (on ventral or dorsal side)
15	tibiae I and II on interior side for entire length
15	tarsi I nearly entirely at least dorsally
15	tarsi II predominantly on dorsal side
5	tarsi III with faint indication of whitish stripe on 1 or 2 segments
10	tarsi III uniformly black

femora I and II except basally, tarsi I and II almost entirely (except tips of all segments of tarsi II and of metatarsus of tarsi I), sometimes more or less distinct stripes on anterior side of segments of tarsi III, rarely tarsi III predominantly white; apical part of postpetiole often obscure red; flagellum without annulus.

FLAGELLUM: With 50-51 segments, and with narrowly-lanceolate tyloids on segments 9 or 10 to 22, those on segments about 15-20 more or less distinctly widened, longish oval, and reaching close to bases and apices of segments.

HEAD: Temple profile more narrowed behind eyes than in *radtkeorum*, not curved; lower cheeks more distinctly receding toward carina genalis, nearly from margin of eyes on; clypeus a trifle more depressed.

THORAX: Mesoscutum not quite as densely and coarsely sculptured as in *radtkeorum*, somewhat shiny between punctures; scutellum less raised above postscutellum, moderately convex, laterally usually carinate at base; area superomedia on the average smaller and narrower than in *radtkeorum*, usually longer than wide and narrowed toward area basalis, often into a point.

LEGS: Femora slightly more slender than in *radtkeorum*. Femora II on anterior side and all tarsi more extensively white than in the latter species, particularly tarsi III in contrast to *radtkeorum* usually extensively white.

ABDOMEN: Tergites somewhat less strongly sclerotized and less coarsely sculptured than in *radtkeorum*, this is particularly noticeable on tergites 5-7, which are not markedly convex and not at all bulging laterally. Basic color of abdomen a shade lighter than in *radtkeorum*.

• **DISTRIBUTION** (map 2): The southeastern lowlands from Pennsylvania and Maryland south to Florida, Georgia, and Alabama. ALABAMA. Dekalb Co.: 1 female, Rainsville, 9-VII-1970, G. Heinrich (CGH II). FLORIDA. Highlands Co.: 6 females, 1 male, Archbold Biological Station, 29-III-11-V-1967, G. Heinrich (CGH II); Highlands Hammock State Park; 1 intersex, 27-IV-1968, G. Heinrich; 5 females, 14 males, 2-VIII-1-IX-1969, G. Heinrich, D. Radtke; 2 females, 1-X-3-XI-1969, R. W. Miller (all CGH II). GEORGIA. Monroe Co.: 2 females, Forsyth, 6-VII-1969 and 23-31-VII-1969, G. Heinrich (CGH II). MISSISSIPPI. Oktibbeha Co.: 1 female, Starkville, 12-18-VI-1971, C. Sartor. Yalobusha Co.: 1 female, Water Valley, 1-VII-1970, G. Heinrich (CGH II).

3b. *Protichneumon grandis inornator* new subspecies

Map 3

SYSTEMATICS: A very large, strongly sclerotized and coarsely sculptured form,



Map 2. *Protichneumon grandis grandis* Brullé

most similar to *radtkeorum* in color and appearance; clearly distinguished from *radtkeorum* by structure of femora III, head, and flagellum which all agree with, or closely approach *grandis grandis*. Temple profile and cheek profile more swollen than in *grandis*, the sculpture of mesoscutum and 5th tergite denser and coarser, the scutellum more raised, area superomedia on the average more narrowed and pointed toward the base, approaching the shape of a Gothic arch; all these differences from *grandis* are very subtle, but they are complemented by chromatic characters such as the total lack of white markings, in both sexes, on the thorax and the reduction of white on the anterior pairs of legs in males. The form is treated tentatively as a subspecies of *grandis*, but the possibility that it represents a very similar but distinct species, more widely distributed than known at present, can not be precluded; a hint in favor of this hypothesis can be found in the female from northern Florida, Liberty Co.; this specimen is considerably smaller (24mm long) than all specimens of the type series, but agrees with them otherwise.

Decisive for the tentative subspecific association of this form with *grandis* was the fact that typical specimens of *grandis* though abundant further north (Highlands Co.), have not been found in Lee Co. so far; this fact supports the hypothesis that *inornator* replaces *grandis* geographically.

FEMALE: Length 28-29 mm. Differs from *grandis grandis* by lack of white markings on scutellum, vertical orbits, and frontal orbits (these orbits being ferruginous tinged instead); postpetiole often partially dark ferruginous; color otherwise as in *grandis grandis*.

MALE: Length 30 mm. Extremely similar to the sympatric *radtkeorum*, but at once distinguishable by the considerably narrower, more elongate tyloids; differs from *grandis grandis* by reduction of white markings on head, thorax and legs as follows: head black, with the following white parts: face, clypeus, lower part of frontal orbits, a short and narrow line on the middle of outer orbits, and upper part of basal 1/2 of mandibles; no white mark on vertical orbits; thorax uniformly black; abdomen dark brown red, except black 1st segment; legs black, white are only: anterior side of tibiae I and of femora I, tarsi I and II partially, and a small apical spot on the inner side of femora II and of tibiae II; all coxae uniformly black.

FLAGELLUM: Narrow, elongate-elliptic tyloids on segments 8-20, the 1st punctiform, the longest, on segments 13-17 almost reaching bases and apices of segments. Black, scape ventrally white.

Holotype: female, Florida, Lee Co., Orange River, Ft. Myers, 14-IV-1968 (CGH II). **Allotype:** male, same locality, 24-XII-1971 (CGH II). **Paratypes:** 5 females, same locality, 14-IV-1968, 29-V-1970, 20-IX and 22-XII-1971, 27-I-1972 (CGH II).

DISTRIBUTION (map 3): In addition to the type material, 1 other tentative Florida record is known: Liberty Co.: 1 female, Torreya State Park, 14-V-1969, H. V. Weems, Jr. (CGH II).

4. *Protichneumon effigies* Heinrich

Protichneumon effigies Heinrich, 1961:26-7, females/males.

Holotype: female, Maine, CGH II. **Allotype:** male, USNM.

SYSTEMATICS: The smallest of the North American species of the genus, well distinguished in females by the slender flagellum, with the 1st segment more than twice as long as wide, and by the large, evenly trimmed scopa; in both sexes by the light red, close to orange-tinged color of the abdomen (similar to *ambiguus*, but including the 1st segment or at least the postpetiole). Flagellar proportions similar only to *radtkeorum*, which is strikingly distinguished by almost twice the size of *effigies*, by dark chesnut-



Map 3. *Protichneumon grandis inornator*, n. subspecies

brown color of the abdomen (excluding the black 1st tergite) and by a smaller scopa.

The species has not been recorded yet from the southeastern states, but may well occur south of the so-far-known southern limits of its distribution.

FEMALE: Length 17-20 mm. Black, including legs and usually petiole; abdomen, including postpetiole light, close to orange-tinged red; wings uniformly, but only moderately deeply infuscated; scutellum always entirely black; frontal orbits and vertical marks narrowly white; anterior side of tibiae I and of tip of femora I ivory; flagellum with dorsal white annulus on segments 7 or 8 to 14, 15, or 16.

FLAGELLUM: Bristle shaped, fairly long, ventrally flattened and slightly widened beyond middle, apically strongly attenuated and pointed, with 47-49 segments; basal segments elongate, the 1st about 2.5 times as long as apically wide, in lateral view the 8th or 9th square, the widest, seen from the flat side, slightly more than twice as wide as long.

MALE: (Specimen from Idaho): Length 19 mm. Color as in female, with the following additional white marks: bands on facial orbits, narrow bands on median part of outer orbits, apical margin of 1st trochanters I, and anterior side of femora and tarsi I (legs II lacking); in this male, in contrast to all other males of the genus, face and clypeus (the

former except facial orbits) black; flagellum without annulus.

FLAGELLUM: With moderately narrow, elongate-elliptic tyloids on segments 7-18 or 19, or (Idaho) 21.

DISTRIBUTION: Transcontinental, from Newfoundland, Ontario, Saskatchewan, Alberta, and British Columbia south to Colorado and Kansas. New record: IDAHO. 1 female, 1 male, Craters of the Moon, VIII-1965, D. S. Horning (CGH II).

5. *Protichneumon victoriae* Heinrich, new status

Protichneumon grandis victoriae Heinrich, 1961:25-26, female, male.

Holotype: female, British Columbia; CNC (No. 6996). Allotype: male, CNC.

SYSTEMATICS: This form shares with *ambiguus* the only normally sclerotized structure, and neither very dense nor coarse sculpture of tergites, and thus could be associated as a subspecies rather with *ambiguus* than with *grandis*. On account of its strong chromatic differentiation and the complexity of the entire genus it is now considered as a distinct species.

Distinctive characters are the extensively to entirely light ochreous-tinged red color of femora, tibiae, and tarsi in both sexes, in combination with weakly sclerotized and sculptured tergites.

FEMALE: Length 23-26 mm. Black; femora and tibiae predominantly or entirely, the postpetiole and tergites 2-7 entirely light ochreous-tinged red; frontal and vertical orbits narrowly white, in specimen from California broadly ferruginous; clypeus in specimen from California ferruginous, in holotype faintly obscure-red tinged medially; wings moderately infuscated; flagellum with dorsal white annulus on segments 6 or 7 to 13 or 14, scape in specimen from California ventrally ferruginous.

MALE: Length 25 mm. Black, including coxae and trochanters; postpetiole, tergites 2-7, and basic color of rest of legs light ochreous-tinged red; the following white: mandibles partially, clypeus, sides of face broadly, frontal and vertical orbits narrowly (red tinged), apex of scutellum (white or ferruginous), anterior side of tibiae I and tarsi I and II predominantly; wings moderately deeply infuscated; flagellum without annulus.

FLAGELLUM: (specimen from California): with 49 segments, and with elongate-elliptic tyloids on segments 8-22, the longest on

segments 12-19, practically reaching from bases to apices of segments. Black, ventrally brownish, scape ventrally white.

DISTRIBUTION: The few records at hand until now suggest a distribution restricted to a comparatively narrow strip along the west coast of North America, eastward not beyond 120°; known so far from Vancouver Island in the north, close to Sacramento, California in the south. New record. CALIFORNIA. Plumas Co.: 1 female, 1 male, west of Quincy, 6-VII-1949 (CHT, CGH II).

6. *Protichneumon polytropus* Heinrich

Protichneumon polytropus Heinrich, 1961: 27, male.

Holotype: male, North Carolina; USNM.

SYSTEMATICS: The holotype has been reexamined. I am still convinced that it represents a distinct species, although during the 8 years since the original description no 2nd specimen has been found.

The species shares with *grandis* and *radtkorum* the strong sclerotization and coarse and dense sculpture of tergites 2-4, and with the western species *victoriae* the red color of femora and tibiae III. It is chromatically furthermore distinguished by entirely light-red abdomen, only laterally white clypeus and face, and uniformly black femora and tibiae II.

The distribution of the species may include the southeastern states rather than the northeastern, as hinted by the structure and sculpture of tergites.

MALE: Length 19 mm. Black, tergites 1-7 and femora and tibiae III light ferruginous red; the following white: sides of clypeus and face, frontal orbits narrowly up to lower ocellus, small marks on vertical orbits, narrow stripe on middle of outer orbits, mandibles predominantly, scape ventrally, anterior side of tibiae I, and segments 1-5 of tarsi I and II (all except infuscated apices); wings strongly infuscated; flagellum without annulus.

FLAGELLUM: With 45 segments and small, rather narrow tyloids (between bacilliform and elongate elliptic) on segments 7-22.

HEAD: Temple profile distinctly narrowed behind eyes, with almost straight outline; malar space less than 1/2 as long as width of mandible base.

THORAX: Mesoscutum moderately convex, coarsely and moderately densely punctured, polished between punctures; anterior section of notauli distinct; scutellum rather strongly convex, somewhat more finely punctured

than the mesoscutum; area superomedia distinctly longer than wide and distinctly narrowed toward area basalis, not clearly separated from areae posteromedia.

LEGS: Femora III moderately slender.

ABDOMEN: Gastrocoeli large and deep, their interspace narrower than 1 of them, strongly longitudinally striate, as is also the median field of postpetiole; tergites 2-5 coarsely and densely irregularly striate punctate, separated by pronounced sutures and laterally somewhat bulging toward apices.

DISTRIBUTION: North Carolina.

7. *Protichneumon sartoris* Heinrich

Map 4

Protichneumon sartoris Heinrich, 1971:961-962, female.

Holotype: female, Starkville, Mississippi; CGH II.

SYSTEMATICS: Females of this species are clearly distinguished from *grandis* and *ambiguus* by a combination of the following characters: (1) femora III considerably more slender; (2) flagellum more slender, less widened beyond middle, with more elongate basal segments; (3) scopa on coxae III considerably larger and denser; (4) postpetiolus red; (5) size considerably smaller than *grandis*.

Agrees in characters (1) and (2) with *radtkeorum*; differs from *radtkeorum* most decisively by characters (4), (5) and particularly (3), and in addition by more convex temples and cheeks.

Apparently more closely related to *effigies* than to any other species of the genus, as indicated by the unusually large scopa, relatively small size, and red color of the postpetiole; differs from *effigies* by coarser and denser sculpture of tergites, by the dark chestnut-red (instead of light orange-ferruginous) color of the abdomen, and by the cheek profile less narrowed toward mandible base.

FEMALE: Length 20 mm. Black, including nearly entire legs and base or most of petiole; postpetiole and rest of abdomen dark chestnut red; wings uniformly and deeply infuscated; white are: small marks on orbits of vertex, frontal orbits narrowly, and anterior side of tibiae I; flagellum with dorsal white annulus on segments 6 or 7 or 8 to 13 or 14 or 15.

FLAGELLUM: Bristle shaped, moderately long, ventrally flattened beyond middle and

moderately widened, apically strongly attenuated and pointed, with 46 (2 specimens from Mississippi and Tennessee) or 49 (2 specimens from Georgia) segments, the 1st about 2.5 times as long as apically wide, the 8th or 9th square in lateral view, the widest on the flat side nearly 2.5 times as wide as long.

HEAD: Temple profile, in vertical view, scarcely narrowed behind eyes and distinctly more curved than in *grandis*; cheek profile, in frontal view, as in *grandis* slightly narrowed toward mandible base; cheeks in lateral view comparatively wider than in *grandis* and distinctly more convex (= "swollen"); carina occipitalis, in vertical view, forming a deeper arch than in *grandis*; frons at and immediately below lower ocellus less concave.

THORAX: Mesoscutum and particularly scutellum more strongly convex than in *grandis*, both stronger and more densely punctured all over; otherwise as in *grandis*.

LEGS: Rather slender; femora III considerably more slender than in *grandis*, in lateral view their dorsal outline nearly straight, not curving down tangibly toward base or toward apex; coxae III very densely punctured all over, with very large and dense, fairly evenly trimmed scopa.

ABDOMEN: Tergites 2-4 as in *grandis* and *radtkeorum* coarsely and very densely sculptured and strongly sclerotized, separated from each other by distinct, but less pronounced, sutures.

MALE: So far no male could be definitely associated with this species; I suspect that the male is represented in the broad series of "*grandis*" males collected in all localities where the *sartoris* females have been found; but, several attempts to separate another species from these series by structural and/or chromatic characters have failed.

DISTRIBUTION (map 4): Known from Georgia, Mississippi, Tennessee, and Arkansas. ARKANSAS. Washington Co.: 1 female, county only, 1-X-1939 (USNM). GEORGIA. Bartow Co.: 1 female, Stamp Creek, 28-VII-1969, H. V. Weems, Jr. Monroe Co.: 1 female, Forsyth, 28-V-4-VI-1970, F. Naumann (both, CGH II). MISSISSIPPI. Oktibbeha Co.: 1 female, Starkville, 14-20-VII-1970, C. F. Sartor (CGH II). TENNESSEE. Henderson Co.: 1 female, Natchez Trail State Park, 2-7-VI-1972, G. Heinrich (CGH II).



Map 4. *Protichneumon sartoris* Heinrich

8. *Protichneumon regnatrix* (Cresson)

Ichneumon regnatrix Cresson, 1864:178, female.

Protichneumon grandis, Townes and Townes, 1951:304, partim (*Ichneumon regnatrix* Cresson as synonym).

Protichneumon grandis regnatrix, Heinrich, 1961:25, female.

Holotype: female, Delaware; ANS (no. 1437).

SYSTEMATICS: The species name *grandis* has been restricted, in this revision, to the strongly sclerotized southeastern form as the result of a recent examination of the type; as consequently *grandis* and *regnatrix* are now sympatric, the hypothesis that the 2 forms are subspecifically associated (Heinrich 1961, 1962) can not be maintained. Only 2 alternative are left now: either *regnatrix* represents a mere mutation and thus a synonym of *grandis*, or it is a distinct species.

The type of *regnatrix* agrees in all structural characters with *grandis*, except for the lack of scopa on coxae III. As a rule, the presence or absence of the brush-like complex of dense hair on the inner, apical surface of the hind coxa of female (= scopa) represents a reliable, specific distinction, particularly within the tribe Protichneumonini; however, abnormal individual mutations breaking the rule of specific structures are known to occur occasionally, particularly in cases of sexually confined characteristics.

I am inclined to lean toward the hypothesis that *regnatrix* represents such individual mutation; however, there is no conclusive proof for this theory yet. The synonymization of any already described and named species, I believe, should not be pronounced before it can be convincingly explained and supported by factual evidence; therefore, *regnatrix* is treated here, tentatively, as a full species in order to keep the matter "in the spotlight" for further research.

Among the more than 100 *Protichneumon* females from the eastern states which I examined between 1960 and 1971, not a single specimen without scopa has been found. At last, in Tennessee 18 June 1972, I collected the first *Protichneumon* female with hairless coxae III; the locality where this specimen without scopa had been found obviously was holding the key to the solution of the *regnatrix* problem. If the lack of scopa in the *regnatrix* type, in fact, indicated a specific character, then it should be possible to find another, congruent specimen in the same area where the 1st one was collected; if, on the other hand, the lack of scopa represented nothing but a very rare individual mutation, then the chances of finding a duplicate during the following days would be close to nil. The greatest effort was made, therefore, to get another female in the same area; I found the 2nd specimen 3 days later; it was a complete replica of the 1st not only in the lack of scopa but also in all other characters, to be mentioned later.

A direct comparison with the holotype of *regnatrix*, however, revealed the surprising fact that the 2 females from Tennessee, although sharing with *regnatrix* the lack of scopa, are different in several other characters from *regnatrix* and *grandis* as well; that they represent a distinct species, different from *grandis* appears indubitable; a subspecific association with *regnatrix* seems unlikely, though not impossible; the form will be described and named tentatively as a full species further on, while the problem of the species *regnatrix* still remains unsolved.

FEMALE: Agrees in structure with *grandis*, except for the lack of scopa; differs chromatically from the type of *grandis* by the lack of white markings on scutellum and on vertical orbits; the extreme end of scutellum and the apical part of the postpetiole are faintly reddish tinged in the holotype (perhaps caused by fading).

DISTRIBUTION: Delaware.

**9. *Protichneumon glabricoxalis*,
new species
Map 5**

SYSTEMATICS: This species shares with the type of *regnatrix* the complete lack of scopa on coxae III, but differs from *regnatrix* and also from *grandis* by: (1) the almost entirely hidden ovipositor, the 7th tergite being in both types somewhat flattened and apically a trifle truncate, the apex of abdomen approaching thus a semi-amblypygous shape; (2) less strongly sclerotized and somewhat finer sculptured tergites 2-4, the 2nd and 3rd tergite not at all bulging laterally and being separated by a less pronounced suture; (3) slightly more widened beyond middle flagellum, the widest segments on the flat side being about 3.5 times as wide as long.

As compared with *grandis*, this form shows also a smaller size and more slender and nearly parallel-sided abdomen. It may perhaps be considered as a southern subspecies of *regnatrix*, should future research confirm the specific status of the latter (see also preamble to *regnatrix*); *glabricoxalis* is treated here tentatively as a full species:

FEMALE: Length 23 mm. Black, including legs and 1st segment of abdomen; rest of abdomen red brown; wings uniformly and very strongly infuscated; white are: fontal orbits narrowly, anterior side of tibiae I, and anterior side of segments 1 and 2 of tarsi I

partially; scutellum uniformly black; flagellum with dorsal white annulus on segments 7-14; coxae III without trace of scopa.

FLAGELLUM: Bristle shaped, moderately long, ventrally flattened and strongly widened beyond middle, with 50 segments, the 1st less than twice as long as apically wide, in lateral view the 6th approximately square, the widest, seen on the flat side, about 3.5 times as wide as long.

HEAD and THORAX: As in *grandis*.

LEGS: Slightly more slender than in *grandis*; tarsi III more elongate and slender; coxae III without trace of a scopa.

ABDOMEN: As described in systematics.

Holotype: female, Tennessee, Henderson Co., Natchez Trail State Park, 18-VI-1972, G. Heinrich (CGH II). **Paratype:** 1 female, same data as above except collected 21-VI-1972 (CGH II).

DISTRIBUTION (map 5): Known only from the type locality in Tennessee.

2. Genus *Coelichneumon* Thomson

Coelichneumon Thomson, 1893:1901. Heinrich, 1961:28-86. Heinrich, 1966:188-247.

Heinrich, 1967:1-10. Type species: *Ichneumon lineator* Gravenhorst; designated by Ashmead, 1900.

Cyanojoppa Cameron, 1902:398. Type species: *Cyanojoppa rufofemorata* Cameron; designated by Viereck, 1914.

Spilojoppa Cameron, 1904a:208. Type species: *Spilojoppa fulvipes* Cameron; monobasic.

Shalisha Cameron, 1904b:221. Type species: *Shalisha fulvipes* Cameron; monobasic.

Lodryca Cameron, 1904b:223. Type species: *Lodryca lineatipes* Cameron; monobasic.

Eugyrus Townes, 1946:57. Type species: *Ichneumon alvarado* Cresson; original designation.

Ichneumon, Townes and Townes, 1951:301. Townes, et al., 1961:403-409. Townes, et al., 1965:520-530. Townes and Townes, 1966:284-286.

SYSTEMATICS: Since 1951 (see Townes and Townes, 1951:302), there has been controversy about the valid name of this genus (*Coelichneumon* Thomson versus *Ichneumon* Linnaeus). For the essence of this controversy see Townes (1969:15-18) and Heinrich (1961:11, nomenclature). This controversy has a merely judicial character without morphological implications. Mor-



Map 5. *Protichneumon glabricoxalis* n. sp.

phological considerations, however, are decisive for the limitation and definition of this genus in relation to various other generic names introduced mainly by Cameron at the beginning of this century. For detailed discussion of these problems, see Heinrich (1966:189-190).

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, ventrally flattened beyond middle and, as a rule more or less, rarely not at all, sometimes very strongly widened, apically usually strongly, sometimes only moderately attenuated; of males always with row of distinct tyloids, and slightly nodose, with transverse, inconspicuous bristle ridges on ventral side.

HEAD: Normal; temple profile in vertical view as a rule more or less narrowed behind eyes and more or less curved, exceptionally inflated; malar space short, usually markedly shorter than width of mandible base; mandibles usually normal, fairly broad, the apical tooth not very much longer than the subapical, exceptionally with specific peculiarities (*azotus* group); apical margin of clypeus straight or with minute projection in the middle.

THORAX: Mesoscutum moderately convex, anterior part of notauli usually indicated to distinct; sternauli obsolete; scutellum flat to moderately raised above postscutellum, laterally not carinate, sometimes basally with lateral edges; propodeum moderately to distinctly abbreviated, with distinct basal furrow, areae dentiparae more or less steeply arched downward from costulae fairly close to bases of coxae III, their apices never prominent; area basalis and area superomedia as a rule not separated by a prominent carina, often fused, the latter more or less narrowed in front; area basalis usually not deepened, except often its anterior part.

LEGS: Moderately long, femora moderately stout to fairly slender; coxae III of females often with scopa.

WINGS: Nervulus postfurcal; areolet as a rule pentagonal, although more or less narrowed in front; sometimes intercubiti coalescent in front; radius slightly sinuate.

ABDOMEN: Of females oxygygous; gastrocoeli always large and deep, their interspace somewhat to considerably narrower than 1 of them; postpetiole usually with distinct median field, which is, as a rule, longitudinally striate, as is usually also the interspace of the gastrocoeli and the base of 3rd tergite medially; in some Nearctic species postpetiole regularly and coarsely punctured

(*azotus* group), in a few species rugose and coriaceous; ovipositor as a rule only slightly, exceptionally considerably projecting.

CHROMATIC CHARACTERS: Basic color in vast majority of Nearctic species black or metallic blue, with, as a rule, more or less restricted white markings on head, thorax, and sometimes legs in females; abdomen never apically white marked, but sometimes the postpetiole apically white; apico-lateral white marks on anterior tergites beyond the 1st occur very frequently in Oriental and also in 4 European species, but are known so far only in 1, very rare Nearctic species; white marks on head, thorax, and legs are, as a rule, more extended in males than in females.

DISTRIBUTION: Distributed over the entire Holarctic and Oriental Regions, with the peak of speciation apparently in the mountain forests of the latter; lacking in Africa, south of the Sahara, and apparently also in the Australian zone; reaching with a few species from the Nearctic zone into Central America south to Panama (Townes and Townes, 1966); according to information received from C. C. Porter, at least 4 or 5 typical *Coelichneumon* species have been found in N. W. Argentina.

HOSTS: Various groups of Heterocera.

Key to species of *Coelichneumon* Thomson of the Southeastern States

FEMALES

1. All femora medially on both sides extensively white marked; mesopleura, metapleura and mesosternum white marked. (Abdomen bluish black; scutellum laterally white, with longitudinal median black band; length 17-18 mm) 1. *pulcher* (Brullé)
- Femora, pleura, and mesosternum not white marked. 2
2. Basic color of at least abdomen, usually also of thorax clearly bright metallic blue. (Scutellum medially black, laterally white or ivory) 3
- Basic color of body black, at most abdomen in strong light, with a faint bluish tinge in a few species. 6
3. Basic color of mesoscutum black, as a rule with 2 short median white lines. (Basic color of head and femora also black, without metallic-blue tinge; coxae III with distinct scopa; length 14-17 mm. 2. *eximius* (Stephens)

- Basic color of mesoscutum metallic blue, as a rule without median white markings. 4
- 4. Coxae III without a trace of scopa. (Pronotal ridge entirely or extensively ivory, as are also collare and subalarum; length 16 mm. 4. *nudus* Heinrich
- Coxae III with distinct scopa. 5
- 5. Pronotal ridge broadly ivory; coxae III with extremely large evenly trimmed scopa; temple profile not much narrowed behind eyes, with curved outline; length 19 mm. 5. *magniscopa* Heinrich
- Pronotal ridge not, or barely ivory marked; coxae III with distinct but not unusually large scopa; temple profile strongly narrowed behind eyes, with almost straight outline; length 13-17 mm. 3. *sassacus* (Viereck)
- 6. Scutellum with median longitudinal black band and wedge-shaped lateral white marks; all tibiae and metatarsi with conspicuous basal white annulus. (Orbits broadly white around eyes, except on malar space; length 8-12 mm). 7
- Scutellum apically to predominantly white, or entirely black, but not with longitudinal median black band and white sides; never all tibiae and metatarsi with basal white bands. 8
- 7. All coxae and trochanters black, at most coxae I with small apical white mark. 10 a. *navus navus* (Say)
- Coxae I and II apically and all trochanters ventrally white. 10 b. *navus albidior*, new subspecies
- 8. Wings uniformly and very deeply, exceptionally only moderately (*orpheus* Cresson) infuscated. (Large species, 16-22 mm long). (*maurus* group) 9
- Wings not markedly infuscated. (Species usually smaller, less than 17 mm long) 12
- 9. Carina oralis laminately elevated and sloping away from the mouth; postpetiole coarsely punctured, without striation. (Scutellum with sharp lateral edges at base, never marked with white; length 16-18 mm). 8. *viola* (Cresson)
- Carina oralis not laminately raised; postpetiole either longitudinal striate or irregularly rugose. (Length 18-22 mm). 10
- 10. Postpetiole irregularly coriaceous rugose, without longitudinal striation; mesosternum forming with mesopleuron a continuous rather sharp edge; 3rd tergite on each side of the not depressed median section with a transverse, narrow, smooth furrow. (Scutellum always black; length 19-22 mm). 6. *maurus* (Cresson)
- Median field of postpetiole longitudinally striate, at least on basal part; borderline between mesosternum and mesopleura rounded, not forming a rather sharp edge; 3rd tergite without a smooth, transverse furrow on each side of base. (Scutellum black, or apically white; length 18-22 mm). 11
- 11. Coxae III with distinct scopa; flagellum markedly widened beyond middle, the widest segment twice to slightly more than twice as wide as long on flat side; wings very deeply infuscated. (Length 18-20 mm). 7. *histricus* (Cresson)
- Coxae III without scopa; flagellum barely widened beyond middle, the widest segment about 1.3 times as wide as long on the flat side; wings moderately infuscated. (Length 20 mm). 9. *orpheus* (Cresson)
- 12. Mandibles with subapical tooth small and separated from the distinctly longer apical tooth by a distinct notch only, but not by a wide and deep gap. (Median field of postpetiole striate or irregularly punctured; coxae III without scopa). 13
- Mandibles with strongly developed subapical tooth, often of almost equal length with apical tooth, and separated from the latter by a wide and deep gap (fig. 17). (Median field of postpetiole never aciculate, but more or less densely punctured instead). (*azotus* group) 15
- 13. Median field of postpetiole irregularly punctured; flagellum lanceolate, the widest segment on the flat side nearly 4 times as wide as long; white on scutellum covering only its apical margin and its lateral margin either toward apex only or nearly for its entire length. (Coxae III without scopa; tibiae III basally on

- exterior side with white mark; length 13-14 mm). 12. *lisae*, new species
- Median field of postpetiole regularly longitudinally striate; flagellum more or less strongly attenuated toward apex, but much less widened beyond middle; scutellum entirely white or basally more or less extensively black. 14
14. Tibiae II and III entirely black; coxae III without scopa; abdomen uniformly black; smaller species; length 11-12 mm. 11. *vitalis* (Cresson)
- Tibiae II and III broadly white banded basally; coxae III with distinct scopa; 7th tergite with white mark; larger species; length 14-16 mm. *deliratorius* (Linnaeus) (for generic position see Heinrich, 1971:967)
15. Coxae III without trace of scopa. .. 16
- Coxae III with distinct scopa. 17
16. Junction of carinae oralis and genalis slightly elevated and triangularly projecting; apical margin of clypeus distinctly emarginate; upper mandible tooth clearly longer than the lower; cheeks considerably swollen; scutellum black, sometimes apically restrictedly white. (Length 13-15 mm). 14. *jejunus* (Cresson)
- Junction of carinae oralis and genalis not elevated and not at all projecting; apical margin of clypeus straight; lower mandible tooth subequal with upper; cheeks only slightly swollen; scutellum entirely white. (Length 12-13 mm). 16. *pseudowalleyi*, new species
17. Prescutellar carinae black; white mark on scutellum medially in a gradual curve approaching the basal furrow. (Length 15-16 mm). 13. *azotus* (Cresson)
- Prescutellar carinae extensively white; white mark on scutellum restricted to its apical part and emarginate medially in a gradual curve toward apex of scutellum. (Length 14-17 mm). 15. *punctifer* Heinrich
- MALES**
1. Mesosternum predominantly to entirely white; mesopleura with 2 large white marks (sometimes confluent); all femora on interior and exterior side extensively white. (Length 16-18 mm). 1. *pulcher* (Brullé)
- Mesosternum, mesopleura, and femora not or much less extensively white marked. 2
2. Basic color at least of abdomen, usually also of thorax, clearly and bright metallic blue. (Scutellum medially black, laterally white). 3
- Basic color of abdomen and thorax black, the former at the most with a faint bluish tinge. 6
3. Mesoscutum black, without metallic-blue tinge, with 2 short median white lines; femora III in southern populations with conspicuous white mark on exterior side. (Tibiae III on exterior side predominantly white; tarsi III white except black apices of segments; length 15-18 mm). 2. *eximius* (Stephens)
- Mesoscutum metallic blue, without median white lines. 4
4. Temples strongly narrowed behind eyes, with straight outlines; tibiae III black, with short, basal ivory mark on exterior side; prescutellar carinae not ivory marked. (Length 15-17 mm). 3. *sassacus* (Viereck)
- Temples less narrowed behind eyes, with somewhat curved outline; either tibiae III more extensively ivory marked or prescutellar carinae ivory. 5
5. Prescutellar carinae ivory; tibiae III and tarsi III usually uniformly black, the former rarely with indication of small ivory marks on exterior side at or near the base. (Length 16-17 mm). 4. *nudus* Heinrich
- Prescutellar carinae not ivory; exterior side of tibiae III to beyond middle and the tarsi III except black apices of segments, ivory. (Length 19 mm). 5. *magniscopa* Heinrich
6. Wings more or less deeply infuscated. (Large species; length 16-22 mm). ... 7
- Wings not infuscated. 10
7. Carina oralis strongly, laminately elevated and slanting away from the mouth; tibiae and tarsi II and III extensively white. (Prescutellar carinae white marked; postpetiole coarsely punctured, not striate; length 16-21mm). 8. *viola* (Cresson)
- Carina oralis not elevated; tibiae and tarsi III black. 8

8. Median field of postpetiole coriaceous rugose, without aciculation and puncturation; mesosternum and mesopleura forming a continuous, rather sharp edge. (Flagellum without annulus; length 18-22 mm). 6. *maurus* (Say)
- Median field of postpetiole at least on basal part aciculate, apically sometimes coarsely punctured; mesosternum and mesopleura not forming a sharp, but a gradually rounded edge. 9
9. Flagellum with white annulus; cheeks almost flat, receding toward carina genalis, entirely black; 3rd tergite basally on each side of (not depressed) median part with transverse, smooth depression; wings deeply infuscated. (Length 18 mm). 7. *histricus* (Cresson)
- Flagellum without annulus; cheeks distinctly convex, their lower section ivory to mandible base; 3rd tergite without transverse, smooth depression on each side of base; wings moderately infuscated. (Length 20-22 mm). 9. *orpheus* (Cresson)
10. Median field of postpetiole longitudinally striate. (Mandibles narrower, the subapical tooth separated from the apical tooth only by a relatively small notch). 11
- Median field of postpetiole punctured. (Mandibles wider, the subapical tooth separated from the apical tooth by a fairly wide and deep gap and sometimes subequal in length with the apical). 15
11. Scutellum with longitudinal, median black band, only laterally white. (Basal 1/3 or more of tibiae III and at least 1st, sometimes 1st to 3rd segment of tarsi III white, except black apices. (Length 8-12 mm). (navus Say)
- Scutellum without longitudinal, median black band, either apically or entirely white. 13
12. Sterna and pleura uniformly black; only the 1st segment of tarsi II and III basally white; white basal ring on tibiae III restricted to about basal 1/3; coxae III always uniformly black. 10 a. *navus navus* (Say)
- Sterna and mesopleura more or less extensively white marked; 2 or more segments of tarsi II and III basally white; tibiae III usually white to or beyond the middle; coxae III sometimes white marked. 10 b. *navus albidior*, new subspecies
13. Tibiae III with only a short basal white mark; tarsi III uniformly black. (Scutellum basally more or less extensively black, apically white; femora slenderer than in alternative species; length 11-12 mm). 11. *vitalis* (Cresson)
- Tibiae III basally extensively to predominantly white; tarsi III white marked. 14
14. Tyloids very conspicuous, large, on segments 5-10; mesoscutum with 2 short, diverging, median white lines; tibiae III all around white almost from base to beyond middle; tarsi III black except 1st segment, which is white with narrowly black apex; scutellum rather strongly convex, laterally carinate at the base; length 12 mm. 12. *lisae*, new species
- Tyloids inconspicuous, small, on segments 5-16 or 17; mesoscutum never white marked; tibiae III white, except black apex and black band on interior side, reaching from apex close to base; all segments of tarsi III basally white; scutellum barely convex, not laterally carinate at base; length 13-14 mm. 17. *delirops*, new species
15. Face and clypeus white, with broad, median, continuous, longitudinal black band; carina oralis strongly, laminately elevated and slanting away from mouth; wings moderately infuscated. (Prescutellar carinae with white mark; apices of femora III narrowly white; postpetiole not white marked; length 16-21 mm). 8. *viola* (Cresson)
- Face and clypeus entirely white; carina oralis differently structured; wings not infuscated. 16
16. Junction of carina oralis and carina genalis somewhat elevated, forming a tiny, triangular projection, visible in lateral view of the slightly toward mandible tilted head; apical margin of clypeus not completely straight, but very slightly emarginate. (Mandibles neither particularly short, nor very wide, the lower tooth markedly shorter than the upper, postpetiole apically not white marked; tibiae III basally on exterior side usually with a short white line,

sometimes entirely black; tarsi III always black; length 11-16 mm).

..... 14. *jejunus* (Cresson)

- Junction of carina oralis and genalis not at all elevated and not forming a small projection; apical margin of clypeus completely straight. 17

- 17. Prescutellar carinae extensively white; hypopygium medially strongly produced, apically blunted, recalling the structure of some *Spilichneumon* species; mandibles moderately stout, the upper tooth distinctly longer than the lower; apex of femora III not white marked. (Postpetiole with 3 large, sometimes confluent, apical white marks; tarsi III black; length 14-18 mm).

..... 15. *punctifer* Heinrich

- Prescutellar carina black; hypopygium medially not elongate; mandibles rather short and broad, with subequal teeth; apex of femora III white on dorsal side.

..... 18

- 18. Postpetiole apically extensively white; tibiae and tarsi III white for entire length or almost so; scutellum laterally carinate at base, basally more or less extensively black; mesoscutum usually with 2 short, median white lines; length 14-18 mm. 13. *azotus* (Cresson)

..... 13. *azotus* (Cresson)

- Postpetiole uniformly black; tibiae III with only a short, basal white band on exterior side, tarsi III uniformly black; scutellum not carinate laterally at base, uniformly white; mesoscutum uniformly black; length 13 mm. 16. *pseudowalleyi*, new species

..... 16. *pseudowalleyi*, new species

1. *Coelichneumon pulcher* (Brullé)

Map 6

Ichneumon pulcher Brulle, 1846:304, female.
Townes and Townes, 1951:303, female.
Townes and Townes, 1966:285

Coelichneumon pulcher, Morley, 1915:127, female, male (records from Mexico). Heinrich, 1961:46-47, female, male.

Holotype: female, Mus. Nat. d'Histoire Naturelle, Paris. Neallotype: male, CGH II.

SYSTEMATICS: Among the numerous North American species of the genus with metallic-blue basic color of the abdomen (or of the entire body), *pulcher* is uniquely distinguished by extremely rich white markings on thorax and legs, the white including parts (or all) of mesosternum, conspicuous marks on meso pleura, on the

middle of all femora, and on all tibiae. Tergites 2-5 are more strongly sclerotized and separated from each other than in most other species of this genus.

FEMALE:Length 17-18 mm. Abdomen dark metallic blue; head and thorax black, without metallic tinge, with exceptionally rich white pattern; pronotal ridge and sides of scutellum broadly white; mesoscutum with long white longitudinal median stripes; sterna, pleura, prepectus, and all femora and tibiae with white pattern; postpetiole with apico-lateral white marks, coxae and trochanters I and II entirely, III predominantly white, coxae III with indistinct white scopa; flagellum medially only slightly widened, the widest segment on ventral side distinctly less than twice as wide as long.

MALE:Length 16-18 mm. Face and clypeus uniformly white; mesosternum entirely white, or with only a narrow oblique black band along sternauli; the 2 white marks on mesopleura usually confluent, forming a white diagonal band which extends from lower apical corner of mesopleura (where it is confluent with the white of mesosternum) to shortly below subalarum; tarsi I and II extensively white; flagellum without annulus, with narrow, short tyloids on segments 8 or 9 to 20 or 21; scape ventrally white; otherwise as in female.

DISTRIBUTION (map 6): Ontario and Maine south to Louisiana, southern Florida,



Map 6. *Coelichneumon pulcher* (Brullé)

and Mexico (Omitemi, 8,000 ft., Xucumanatlan in Guerrero, 7,000 ft.). FLORIDA. Dade Co.: 1 female, Homestead, O. D. Link (FSCA); 2 females, Paradise Key, 6-7-IV (CHT). Highlands Co.: 1 male, Highlands Hammock State Park, 2-IX-1969, G. Heinrich (CGH II). Lee Co.: Ft. Myers, 12 males, 12-III-9-IV-1968; 1 female, 23-I-1969; 4 males, 21-IV-19-V-1970; 2 females, 9-23-VII-1971; 1 male, 30-X-1971; 1 male, IX-1972, D. Radtke (CGH II). Leon Co.: 1 female, Tall Timbers Research Station, 12-VI-1970, G. Heinrich (CGH II). LOUISIANA. Evangeline Co.: 2 males, Chilcot State Park, 22-28-VII-1971, G. Heinrich (CGH II). MISSISSIPPI. Lafayette Co.: 1 female, IX-X-1967, P. R. Chalaron (CGH II). Yalobusha Co.: 1 female, 10-20-VII-1971, M. Horan (CGH II).

ECOLOGY: Apparently confined to forests with stands of oaks; males appear in Florida about the middle of March and disappear around the middle of April; renewed collecting data during June suggest a 2nd generation.

2. *Coelichneumon eximius* (Stephens) Map 7

Ichneumon eximius Stephens, 1835:186, female.

Ichneumon caeruleus Cresson, 1864:149, female. Townes and Townes, 1951:303, female.

Coelichneumon eximius, Perkins, 1953:107 (*I. caeruleus* as synonym). Heinrich, 1961:47-48, female, male. Heinrich, 1969:939, female, male (variation).

Holotypes: *Ichneumon eximius*, female, London; BM(NH) (No. 3b 1817). *Ichneumon caeruleus*, female, Illinois; ANS. Neallotype: male, (Heinrich, 1961) Dryden, Maine; CGH II.

SYSTEMATICS: Within the group of species with metallic-blue abdomen, this 1 is characterized by a combination of the following characters: (1) basic color of mesoscutum black, without metallic-blue tinge; (2) pleura without white marks; (3) propodeum with distinct blue tinge; (4) mesoscutum almost always with 2 abbreviated, median white lines; (5) coxae III with scopa.

In rare variations, the scopa on coxae III of females can be absent, but, if so, the region of the scopa is nevertheless indicated by fine sculpture and by somewhat flattened surface of the coxa.

In males the exterior side of femora III is more or less extensively white, and the

postpetiole always has 2 apico-lateral white marks which sometimes occur also in females (rarely in northern populations, but in majority of specimens of southern populations).

Southern populations, in both sexes, on the average somewhat more extensively white marked than northern populations.

FEMALE: Length 14-17 mm. Abdomen dark metallic blue; basic color of head and thorax black, the pleura with a slight, propodeum with a more distinct bluish tint; white are: mark on mandible base, small lateral marks on clypeus, and orbits in individually varying extent, on the average more extensively in southern, less in northern populations; white on orbits always interrupted on malar space, often also on facial orbits and, particularly in northern populations, on temples; in northern specimens white often almost entirely lacking on outer orbits; 2 abbreviated median lines on mesoscutum, sides of scutellum, pronotal ridge, subalarum more or less extensively, usually the postscutellum and marks on tegulae, and sometimes apico-lateral marks on postpetiole; legs I and II white marked as follows: apices of femora I and II and anterior side of tibiae I, sometimes in northern, usually in southern populations also anterior side of tibiae II more or less extensively, exceptionally also a stripe on anterior side of tibiae III, in southern populations usually small mark on ventral side of coxae I; flagellum with dorsal white annulus on segments 7-12 or 13 or 14.

FLAGELLUM: With 36-41 segments, the first slightly more than twice as long as apically wide, in lateral view the 9th approximately square, the widest on the flat side twice to somewhat more than twice as wide as long.

HEAD: Temple profile and cheek profile only slightly narrowed behind eyes and toward mandible base, respectively, both with curved outlines; cheeks in lateral view broad and distinctly convex; malar space considerably shorter than width of mandible base; face and clypeus densely and coarsely punctured, the median field of face somewhat protruding; clypeus broad and short, the apical margin a trifle projecting toward the middle.

THORAX: Mesoscutum slightly convex, densely punctured, the median lobe finely coriaceous between punctures, anterior 1/3 of notauli fairly distinct; scutellum barely

convex, sparsely punctured, shiny between punctures; area basalis and area supero-media confluent, impunctate; lateral carinae of area posteromedia obsolete.

LEGS: Moderately stout; coxae III densely punctured on ventral side, finely coriaceous between punctures, with scopa.

ABDOMEN: Median field of postpetiole at least basally longitudinally striate, apically coarsely and densely punctured, as are also the lateral fields; interspace of gastrocoeli coarsely longitudinally striate to about middle of 2nd tergite; base of 3rd tergite medially with some finer, longitudinal striation; rest of 2nd and 3rd tergites coarsely and densely punctured, 4th tergite also rather densely but somewhat finer punctured, the following tergites with extremely fine, coriaceous sculpture, shiny and almost impunctate; ovipositor somewhat projecting.

MALE: Length 15-18 mm. Basic color of body and white markings on thorax as in female, except for usually an additional white mark on upper exterior part of prepectus; white on head and particularly on legs much more extensive than in female; femora III often white marked on exterior side in southern populations; scape ventrally white, flagellum without annulus.

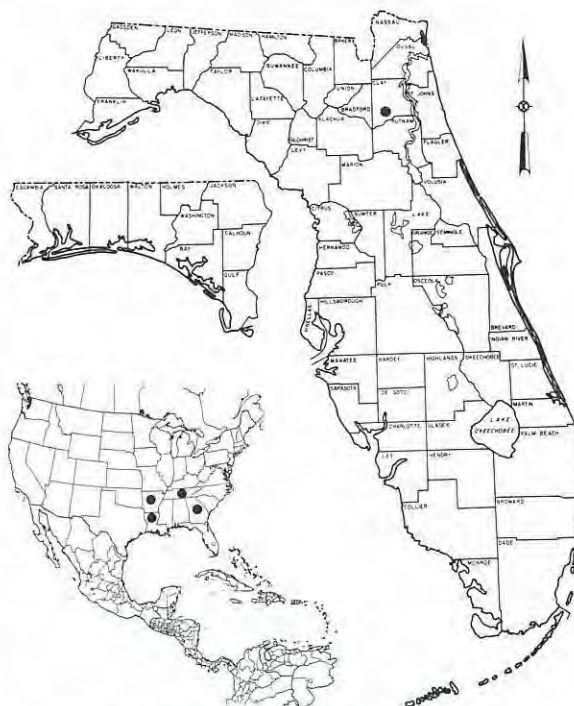
FLAGELLUM: With 36-41 segments, slightly nodose, with distinct, transverse bristle ridges on ventral side of segments and with bacilliform tyloids on segments 6 or (usually) 7 or 8 to 17 or 18 or 19.

HEAD: Black, the following white: face and clypeus uniformly, mandibles except teeth, orbits around eyes narrowly interrupted only on malar space and including entire width of cheeks near mandible base.

THORAX: As described for female. Tegulae usually entirely white; white mark on exterior upper section of prepectus and on apex of prosternum.

LEGS: White are: anterior side of femora I and II and of tibiae I and II, exterior side of tibiae III usually predominantly to entirely, except apically, usually mark on exterior side of femora III in northern populations, most of exterior side of femora III in southern populations; all tarsi dorsally predominantly white except in northern specimens sometimes tarsi III black; coxae I and II and trochanters I and II ventrally (except base of coxae II) and apical margins of trochanters III, exceptionally also a white mark on apex of ventral side of coxae III.

ABDOMEN: Metallic blue, the postpetiole with apico-lateral white marks.



Map 7. *Coelichneumon eximius* (Stephens)

DISTRIBUTION (map 7): Atlantic to Continental Divide in Canadian, Transition and Upper Austral Zones, south to northern Florida and Louisiana. **ARKANSAS.** Garland Co.: 5 females, 3 males, Ouachita State Park, 9-28-V-1972, G. Heinrich, D. Shaneck (CGH II). **FLORIDA:** Clay Co.: 1 male, Gold Head Branch State Park, 29-IV-1971, D. Radtke (CGH II). **GEORGIA.** Banks Co.: 2 females, Homer, 11-12-V-1970, G. Heinrich (CGH II). **LOUISIANA.** 1 male, Bistineau State Park, near Doyline, 16-18-IV-1972, G. Heinrich, D. Shaneck (CGH II). **TENNESSEE.** Henderson Co.: 4 males, Natchez Trail State Park, 1-13-VI-1972, G. Heinrich, D. Shaneck (CGH II).

HOSTS: *Paraphia piniata* Pack. and *Orgyia leucostigma* (J. E. Smith), and *Isia isabella* (J. E. Smith) (Townes and Townes, 1951); *Abagrotis placida* Grote (Heinrich, 1961).

3. *Coelichneumon sassacus* (Viereck) Map 8

Amblyteles (*Coelichneumon*) *sassacus* Viereck, 1917:349, 360, female.

Ichneumon sassacus, Townes and Townes, 1951:303, female.

Coelichneumon sassacus, Heinrich, 1961:40-41, female, male.

Holotype: female, Connecticut, Westville; Connecticut Agricultural Experimental

Station, New Haven, Conn. Neallotype: male, Dryden, Maine; CGH II.

SYSTEMATICS: In this species, as well as in the following, the basic bright steel blue color is not restricted to the abdomen (as in the preceding species) but includes thorax, head, and femora. Females are characterized by a rather large and dense, evenly trimmed scopa, by distinctly narrowed temple profile and cheek profile, and by medially strongly widened flagellum. In both sexes the mesoscutum is always uniformly metallic blue, without median mark.

Females have not been collected in the southeastern states, but the 3 males recorded below from Arkansas match northern specimens of this species so well, that specific identity seems unquestionable.

FEMALE: Length 13-17 mm. Basic color bright steel blue, including head, thorax, and femora with restricted ivory markings; always ivory are: frontal orbits narrowly, line on outer orbits, vertical marks and collare, usually also wedge-shaped lateral marks on basal 1/2 of scutellum; rarely ivory are: apical mark or line on pronotal ridge, a mark on subalarum, upper facial orbits narrowly, and small lateral spots on clypeus; extreme apex of femora I and II ventrally and the anterior side of tibiae I ivory; flagellum with dorsal white annulus on segments 7 or 8 to 12 or 13.

FLAGELLUM: With 38-42 segments, the 1st fully twice as long as wide, the 8th square, the widest on the flat side twice as wide as long.

HEAD: Temple profile and cheek profile strongly narrowed behind eyes and toward mandibles respectively, both with almost straight outlines; cheeks not swollen, almost flat, malar space almost as long as width of mandible base; mandible fairly slender, narrowed toward apex; face and clypeus coarsely and densely punctured, median field of the former somewhat protruding, apical margin of the latter medially a trifle protruding.

THORAX: Mesoscutum very coarsely and densely punctured, coriaceous between punctures; notauli indicated only at the base; scutellum slightly convex, smooth and shiny, with scattered punctures; area superomedia and basalis confluent, the latter deepened in front; lateral carinae of area posteromedia obsolete.

LEGS: Coxae III ventrally densely and coarsely punctured, coriaceous between

punctures, with large, dense, evenly trimmed scopa.

ABDOMEN: As described for *eximius* (Stephens).

MALE: Length 15-17 mm. Basic color bright steel blue, including head, thorax, and femora; mesoscutum, postpetiole, and femora III never ivory marked; collare, pronotal ridge, subalarum, and sides of scutellum ivory, sometimes an ivory mark on exterior part of prepectus; head and legs I and II extensively ivory, middle of face and of clypeus more or less extensively black; legs III metallic blue, except only a small basal ivory mark on exterior side of tibiae III and black tarsi III; scape ventrally ivory, flagellum without annulus.

FLAGELLUM: Structure as in preceding species; with 41-43 segments and with narrow, bacilliform tyloids on segments 8 or 9 to 18 or 19.

HEAD: As in female, temple profile markedly narrowed behind eyes and more strongly than in the following and the preceding species, with straight outline; malar space about 1/2 as long as width of mandible base. Ivory are: triangular vertical marks confluent with or narrowly separated from ivory frontal orbits, outer orbits from below temple region down not quite to mandible base (widened below over nearly entire width of cheeks), face, and clypeus (except median black mark on both), and mandibles (except teeth and lower margin).

THORAX: As described for female; area superomedia often more clearly separated from area basalis.

LEGS: Basic color of femora and coxae metallic blue, of tibiae and tarsi black; ivory are: anterior side of femora, tibiae, and tarsi I and II (except base of femora II), ventral side of trochanters I and II, coxae I predominantly, coxae II ventrally except base, and a small basal mark, sometimes fairly indistinct, on exterior side of tibiae III.

ABDOMEN: All tergites coarsely and densely punctured except the 7th; tergites 1-5 coarsely longitudinally striate in the middle and separated from each other by fairly deep sutures.

DISTRIBUTION (map 8): Quebec, Ontario, and Maine south to Maryland (Townes, 1951) and Arkansas. ARKANSAS. Garland Co.: 3 males, Ouachita State Park, 15-18-V-1972, G. Heinrich, D. Shaneck (CGH II).



Map 8. *Coelichneumon sassacus* (Viereck)

4. *Coelichneumon nudus* Heinrich

Map 9

Coelichneumon nudus Heinrich, 1961:43-44, female. Heinrich, 1969:937-939, male.

Holotype: female, Georgia, Summerville; USNM. Neallotype: male, North Berwick, Maine; CGH II.

SYSTEMATICS: Among the North American species with metallic-blue basic color of the entire body, this 1 is uniquely distinguished by the complete lack of a scopa on coxae III in females. The female is chromatically characterized by entirely or extensively ivory pronotal ridge, subalarum, collare, and sides of scutellum, combined with lack of ivory marks on the mesoscutum; it is similar to *leucographus* Heinrich, which differs clearly by presence of scopa (of moderate size), and particularly by considerably stouter femora. The male is particularly characterized by uniformly ivory prescutellar carinae combined with lack of ivory marks on mesoscutum, and with almost complete absence of ivory color on legs III. Similar in structure to *sassacus* which differs by narrower, less convex temples and cheeks.

The male associated with this species (Heinrich, 1969) was collected in southern Maine in a series of 4 specimens at the same locality and at the same time with 1 female. It

has not been found so far in the southeastern states. The association needs further confirmation.

FEMALE: Length 16 mm. Basic color bright metallic blue, including head, thorax, and femora, with extensive ivory markings; ivory are: mark on base of mandible, small lateral marks on clypeus, frontal and facial orbits, outer orbits below temple regions, triangular marks on vertex, collare, pronotal ridge, subalarum, wedge-shaped lateral marks on scutellum, apical mark on ventral side of femora I and II, anterior side of tibiae I, sometimes also a small apical mark on tibiae II and on coxae I; flagellum with dorsal white annulus on segments 7 or 8 to 13.

FLAGELLUM: With 39-43 segments, the 1st nearly 2.5 times as long as wide, the 9th square, the widest on the flat side twice as wide as long.

HEAD: Temple profile and cheek profile distinctly narrowed behind eyes and toward mandible base respectively, with almost straight outlines; cheeks not swollen; almost flat; malar space about as long as width of mandible base, comparatively longer than in *sassacus* Viereck; clypeus and face coarsely and densely punctured; median field of face somewhat protruding; apical margin of clypeus practically straight.

THORAX: As in the preceding species; area superomedia distinctly wider than long.

LEGS: Coxae III densely and strongly punctured, nearly smooth between punctures, without trace of scopa.

ABDOMEN: Puncturation of tergites 2-4 strong and very dense, but not quite as coarse as in *sassacus*, the striae in the middle of bases of these tergites finer and shorter.

MALE: Length 16-17 mm. Basic color metallic blue, including head, thorax, and legs; ivory are: mandibles (except lower border and teeth), clypeus, face (except partially to entirely black median field), frontal orbits up to vertex, large triangular marks on vertical orbits, outer orbits below temple region (the ivory band gradually widening below over the entire width of cheeks before mandible base), collare, entire pronotal ridge, subalarum, tegulae, prescutellar carinae entirely, sides of scutellum, mark on exterior part of prepectus, dot on apex of prosternum, ventral side of coxae I, apex of coxae II, apical margin of all 1st trochanters partially, anterior side of femora I and of tibiae I and II, anterior side of femora II (except about basal 1/3), anterior side of segments 1-4 of tarsi I and 1-3 of tarsi II,

rarely a small dorsal mark on base of tibiae III or an indistinct mark on their exterior side beyond base; flagellum black, scape ventrally ivory.

FLAGELLUM: With 44-45 segments and with small, narrow-oval tyloids on segments 8 or 9 to 20.

DISTRIBUTION (map 9): Georgia (type locality) and Maine.

5. *Coelichneumon magniscopa* Heinrich

Map 10

Coelichneumon magniscopa Heinrich, 1961: 37-38, female, male.

Holotype: female, Ontario, Great Bend; CNC. Allotype: male, Ontario, Pt. Pelee; CNC.

SYSTEMATICS: The female of this species is rather similar in color pattern to the preceding, *nudus* Heinrich, but is well distinguished by its unusually large, dense, and evenly trimmed scopa, combined with markedly larger size, more strongly widened flagellum, and more convex temples and cheeks.

The male differs from all similar species of the group with metallic-blue basic color of the entire body by having extensively ivory-marked tibiae and tarsi III, combined with the lack of an ivory mark on the mesoscutum. The temples and cheeks are more convex than in *nudus*.



Map 9. *Coelichneumon nudus* Heinrich

The only male recorded (with question mark) from Florida agrees in color pattern best with *magniscopa*, but differs by stronger sclerotization and coarser sculpture of tergites and mesoscutum; it may represent a distinct form, either subspecies or species.

FEMALE: Length 19 mm. Basic color bright metallic blue, including head, thorax, and femora, with extensive ivory markings; ivory are: mark on base of mandibles, small lateral spots on clypeus, facial, frontal, and vertical orbits (the ivory band widened triangularly on vertex), lower 2/3 of outer orbits, collare, pronotal ridge broadly, subalarum, tegulae in part, wedge-shaped lateral marks on scutellum, apical mark on ventral side of femora I and II, anterior side of tibiae I, anterior side of tibiae II partially, and apical margin of 1st trochanters I; flagellum with dorsal white annulus on segments 8-14.

FLAGELLUM: With 43-44 segments, the 1st about twice as long as wide, the 9th square, the widest on the flat side nearly 3 times as wide as long.

HEAD: Temple profile not much narrowed behind eyes, with curved outline: cheek profile moderately narrowed toward mandible base, with slightly curved outline: malar space nearly 2/3 as long as width of mandible base; apical margin of clypeus medially a trifle projecting; median field of face somewhat protruding.

THORAX: Mesoscutum strongly and densely punctured, very finely coriaceous between punctures, notauli indicated only at base; scutellum smooth and shiny, with sparse punctures; area basalis and superomedia confluent, with partially indicated separating carina.

LEGS: Femora fairly stout; coxae III ventrally very densely punctured, coriaceous between punctures, with unusually large, dense, and evenly trimmed scopa.

ABDOMEN: Tergites 1-4 coarsely and fairly densely punctured and strongly longitudinally striate over entire length of middle of 2nd tergite and to beyond middle of median section of 3rd tergite; the middle of the base of 4th tergite finely striate.

MALE: Length 19 mm. Basic color metallic blue including head, thorax, and legs; ivory are: mandibles (except teeth and lower margin), clypeus and face (except median field of both partially to entirely black), frontal orbits up to vertex, large triangular marks on vertical orbits, outer orbits from below temple region down almost to base of

clypeus (widened below over nearly entire width of cheeks), collare, entire pronotal ridge, subalarum, tegulae, sides of scutellum, mark on exterior part of prepectus, ventral side of coxae I, apex of coxae II, apical margin of 1st trochanters I, entire anterior side of tibiae I and II, anterior side of femora I and II except bases, exterior side of tibiae III except apically, all tarsi dorsally except apices of tarsi II and III narrowly infuscated or black; flagellum black, scape ventrally ivory.

FLAGELLUM: With 41 segments and with narrow, fairly short tyloids on segments 9 or 10 to 20 or 21.

DISTRIBUTION:(map 10): Ontario, Massachusetts, Long Island, North Carolina, Florida (Heinrich, 1961), Maine and Louisiana. (CGH II) FLORIDA. Heinrich (1961) no data; ? Lee Co.: 1 male, Ft. Myers, 18-V-1971, G. Heinrich (CGH II). LOUISIANA. 1 male, Bistineau State Park, near Doyline, 18-21-IV-1972, G. Heinrich, D. Shaneck (CGH II).

6. *Coelichneumon maurus* (Cresson)

Map 11

Ichneumon maurus Cresson, 1864:135, female. Townes and Townes, 1951:303, female.

Coelichneumon maurus, Heinrich, 1961:68-70, female, male.

Holotype: female, Virginia; ANS. Neallotype: male, Pennsylvania, Spring Brook; CGH II.



Map 10. *Coelichneumon magniscopa* Heinrich

SYSTEMATICS: This species, the largest of all North American *Coelichneumon* belongs to a group of forms with almost entirely black basic color of the entire body with deeply and uniformly infuscated wings. It may be distinguished from the rather similar and almost equally large species, *histricus* by the flagellum markedly more widened beyond middle and by 3 other indicative, though unobtrusive characters in females: (1) The mesosternum forms with the mesopleuron a rather sharp, continuous edge, with a narrow and very shallow depression immediately above and along this edge. (2) The base of 3rd tergite is medially usually finely and shortly longitudinally striate, and basally not depressed; on each side of this median part, however, the base of the 3rd tergite shows a narrow, transverse, smooth depression, comparable to a pair of narrow thyridia. (3) Postpetiole not regularly longitudinally striate as in most species of the genus, but irregularly rugose and reticulate.

Males share the characters (2) and (3) with the females and show also a faint indication of character (1); they differ from females particularly by usually having partially to predominantly white scutellum, collare, pronotal ridge, and subalarum, and by lack of flagellar annulus; temples more strongly narrowed than in females.

FEMALE: Length 19-22 mm. Thorax and abdomen uniformly black; head and legs black with the following white: frontal orbits narrowly in the middle, often small marks on vertical orbits, ventral mark on apex of femora I, sometimes also of femora II, and anterior side of tibiae I; flagellum with dorsal white annulus on segments 7 or 8 to 15 or 16 (in eastern populations).

FLAGELLUM: With 52-55 segments, the 1st nearly 2.5 times as long as wide, in lateral view the 10th or 11th square, the widest on the flat side about 3 times as wide as long.

HEAD: Temple profile and cheek profile moderately narrowed behind eyes and toward mandible base, respectively, the former slightly curved, the latter almost straight; cheeks and temples slightly convex; frons (in contrast to the following, similar species, *histricus*) immediately below lower ocellus barely concave, fairly coarse rugose punctate; malar space somewhat shorter than width of mandible base; median field of face slightly protruding.

THORAX: Mesoscutum finely and densely punctured, coriaceous between punctures, subopaque; anterior 1/3 of notauli well

developed; scutellum fairly long, gradually narrowed toward apex, raised above post-scutellum, sparsely punctured and smooth between punctures; area superomedia variable in shape, usually about as long as wide, sometimes longer than wide, always narrowed in front, clearly separated by a carina from the deepened area basalis; costulae varying from fairly distinct to obsolete; lower part of mesopleura coarsely irregularly rugose punctate, with a slight and narrow depression along edge of mesosternum; mesosternum apically strongly concave, its posterior border strongly raised.

LEGS: Long and slender; coxae III ventrally finely and fairly densely punctured, coriaceous between punctures, subopaque, with large and dense scopa.

ABDOMEN: Median field of postpetiole without regular striation, instead irregularly reticulate rugose; tergites 2-7 finely coriaceous and subopaque, 2-5 with fine puncturation, gradually decreasing in strength and density from tergite to tergite; space between gastrocoeli longitudinally striate; base of 3rd tergite in the middle usually with short, very fine striation, always with a narrow, smooth, transverse depression on each side; ovipositor slightly projecting.

MALE: Length 18-22 mm. Black, the following white: mandibles (except base, lower section, and teeth), labrum, clypeus (except broadly black median part), face (except black mark covering about lower 1/2 of median field and parts of its upper 1/2), frontal orbits up to level with lower ocellus, marks on vertical orbits, line on middle of outer orbits, collare, pronotal ridge extensively to entirely, small marks on tegulae, mark on subalarum, scutellum except base, and postscutellum (in specimens from Georgia), or only apical marks on scutellum (in northeastern specimens); marks on coxae I or I and II, anterior side of femora I or I and II except bases, anterior side of tibiae I or I and II, basal segments of tarsi I partially, and scape below; flagellum without annulus.

FLAGELLUM: With 47-50 segments and small, bacilliform tyloids on segments 9 or 10 to 23 or 24, the longest covering about median 1/2 of length of segments.

DISTRIBUTION (map 11): Quebec, Ontario, Alberta, British Columbia south to Georgia and California. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 15-18-V-1972, G. Heinrich (CGH II). GEORGIA. Cobb Co.: 1 male, Marietta, 24-IV-1969, G. Heinrich (CGH II). Monroe Co.: 1 male,



Map 11. *Coelichneumon maurus* (Cresson)

Forsyth, 20-IV-5-V-1969, G. Heinrich (CGH II).

7. *Coelichneumon histricus* (Cresson)

Map 12

Ichneumon histricus Cresson, 1867:294, male. Townes and Townes, 1951:303, male.

Ichneumon germanus Cresson, 1877:143, female. Townes and Townes, 1951:303, female.

Coelichneumon histricus, Heinrich, 1961:66-68, female, male.

Holotypes: *Ichneumon histricus*, male, West Virginia; ANS. *Ichneumon germanus*, female, Massachusetts; ANS.

SYSTEMATICS: Another large species of the *maurus* group, with uniformly and deeply infuscated wings; rather similar to *maurus*. Females can be distinguished from *maurus* by the characters discussed in the preamble to that species; males differ by a white flagellar annulus, combined with aciculate median field of postpetiole and a denser and coarser sculpture of the following tergites.

A comparatively high degree of individual variability of females in flagellar proportions, head structure, and shape of areolet suggests, that perhaps 2 extremely similar species may be found under the name of *histricus*, but no conclusive evidence to support such hypothesis has been found so far.

FEMALE: Length 18-20 mm. Black, wings uniformly and deeply infuscated; white are: a narrow, sometimes indistinct, line on middle of frontal orbits, small marks on vertical orbits, rarely a mark on apex of scutellum and/or on subalarum, apex of femora I, and the tibiae I on anterior side; flagellum with dorsal white annulus on segments 6 or 7 to 14 or 15.

FLAGELLUM: Bristle shaped, somewhat widened beyond middle, strongly attenuated at apex, with 51-54 segments, the 1st 2.5 times as long as wide, in lateral view the 10th or 11th square, the widest twice to slightly more than twice as wide as long.

HEAD: Temple profile and cheek profile distinctly narrowed behind eyes and toward mandibles respectively, the latter with almost straight outline, the former with somewhat curved outline in specimens from Tennessee, with practically straight outline in holotype and most northern specimens; frons distinctly concave up to level with lower ocellus; malar space slightly longer than 1/2 the width of mandible base.

THORAX: Anterior 1/3 of notauli fairly distinct; mesoscutum densely punctured, extremely finely coriaceous between punctures, somewhat shiny; scutellum considerably raised above postscutellum, with steep apical slope and with sharp lateral edges at the base; border between mesopleuron and mesosternum, as usually, rounded, not forming an almost sharp angle as in *maurus*.

LEGS: Coxae III with a fairly small, loosely-haired scopa.

WINGS: Nervulus somewhat postfurcal; areolet pentagonal to almost rhomboidal; radius slightly sinuate.

ABDOMEN: Median field of postpetiole longitudinally striate; interspace of gastrocoeli slightly narrower than 1 of them, striate; 2nd tergite very densely and moderately coarsely punctured, 3rd and 4th tergites also very densely but more finely punctured, the 4th more finely than the 3rd; the 5th tergite extremely finely and more sparsely punctured.

MALE: Length 18 mm. Black; the following white: base to nearly all of mandible, face and clypeus (except a longitudinal percurrent or interrupted, median black band), more than lower 1/2 of frontal orbits, marks on vertical orbits, sometimes line on lower part of outer orbits, collare, pronotal ridge partially or entirely, subalarum, marks on tegulae, usually scutellum (either predominantly or apically only), usually apical mar-

gin of prosternum, sometimes a line on outer part of prepectus, apex of coxae I more or less extensively, sometimes apical marks on coxae II, sometimes trochanters I and II ventrally in part, anterior side of tibiae I and II, femora I and II on ventral side (femora I more extensively than II); flagellum with almost complete or dorsal white annulus (in northern specimens usually of lesser extent than in southern) on segments 10 or 12 or 13 to 15, 16 or 17, the subsequent 2-4 segments usually restrictedly white marked; scape ventrally white.

FLAGELLUM: With long, attenuated, and extremely fine apical section; with 46-51 segments and with narrow, elongate-elliptic, rather small tyloids on segments 7 or 8 to 21 or 24, the longest (on about segments 12-18) not reaching close to bases and apices of segments.

HEAD: Malar space nearly 1/2 as long as width of mandible base; temple profile distinctly narrowed behind eyes, slightly curved; frons densely, irregularly rugose and finely coriaceous; cheeks fairly densely punctured.

THORAX: Area superomedia transverse; structure otherwise as described for female.

ABDOMEN: Median field of postpetiole and interspace of gastrocoeli striate; tergites 2-7 densely punctured, the 2nd coarsely, each subsequent tergite finer than the preceding.

DISTRIBUTION: (*map 12*): From Prince Edward Island, Ontario, and British Colum-



Map 12. *Coelichneumon histricus* (Cresson)

bia south to Florida, Tennessee, Arkansas, and South Dakota. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 18-24-V-1972, G. Heinrich, D. Shaneck (CGH II). FLORIDA. Clay Co.: 1 male, Gold Head Branch State Park, 29-IV-1971, G. Heinrich (CGH II). Liberty Co.: 1 male, Torreya State Park, 11-V-1968, H. V. Weems, Jr. (CGH II). TENNESSEE. Henderson Co.: 3 females, Natchez Trail State Park, 3-26-VI-1972, G. Heinrich, D. Shaneck (CGH II).

8. *Coelichneumon viola* (Cresson)

Fig. 12-13, Map 13

Ichneumon viola Cresson, 1864:137, female. Townes and Townes, 1951:303, female, male.

Ichneumon vittifrons Cresson, 1864:143, male.

Ichneumon recens Cresson, 1877:153, male.

Amblyteles viola, Schaffner and Griswold, 1934:140 (host: *Catocala* sp.)

Coelichneumon viola, Heinrich, 1961:65-66, female, male.

Holotypes: *Ichneumon viola*, female, Pennsylvania; ANS. *Ichneumon vittifrons*, male, Delaware; ANS. *Ichneumon recens*, male; ANS.

SYSTEMATICS: A 3rd large species of the *maurus* group, black with deeply infuscated wings. Uniquely distinguished in both sexes by the laminately elevated carina oralis (fig. 12-13) which slopes away from the mouth, and also by the coarsely punctured, not striate, sculpture of the postpetiole. Males can be recognized also by white dorsal side of all tibiae, in combination with white marked prescutellar carinae.

FEMALE: Length variable, usually 16-18 mm. Black; wings uniformly and deeply infuscated; the following white: narrow (usually continuous, sometimes narrowly interrupted before vertex) band on frontal and vertical orbits, outer orbits narrowly from temple region down to usually beyond middle of eyes, collar, and tibiae I and apex of femora I on inner side; flagellum with dorsal white annulus on segments 8 or 9 to 16 or 17; scutellum never white marked; post-scutellum usually obscure-reddish tinged, scutellum rarely so marked.

FLAGELLUM: Bristle shaped, moderately widened beyond middle, strongly attenuated at apex, with 48-49 segments, the 1st more than twice as long as apically wide, in lateral view the 11th square, the widest, on the flat side, about twice as wide as long.

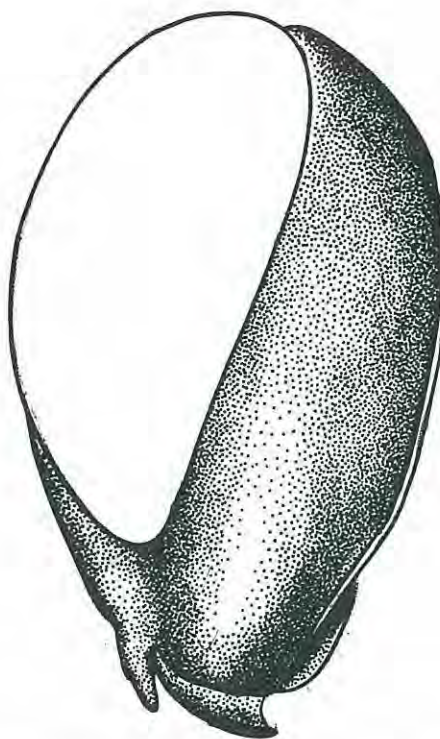


Fig. 12. *Coelichneumon viola* (Cresson) (female). Head, lateral view.

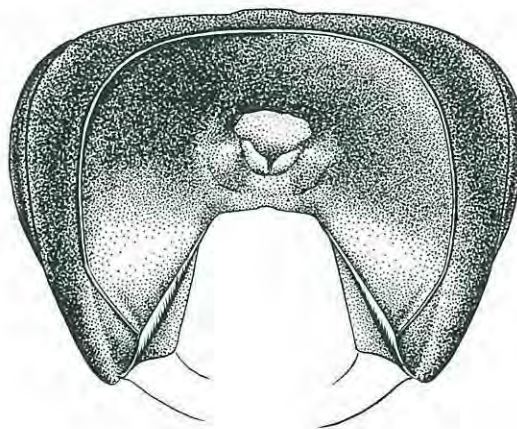


Fig. 13. *Coelichneumon viola* (Cresson) (female). Head, posterior view.

HEAD: Temple profile and cheek profile only slightly narrowed behind eyes and toward mandibles respectively, with distinctly curved outlines; cheeks in lateral view (fig. 12) rather wide and strongly convex; malar space about $\frac{3}{4}$ as long as width of mandible base; frons at and shortly below, level of lower ocellus not concave but flat, densely and moderately coarsely punctured.

THORAX: Anterior $\frac{1}{3}$ of notauli distinct; mesoscutum moderately densely punctured, polished between punctures, shiny; scu-

tellum markedly raised above postscutellum, with sharp lateral edges at base, gradually sloping toward postscutellum, smooth and shiny with a few scattered punctures; area superomedia longer than wide, narrowed in front, with costulae usually in or behind middle; speculum polished.

LEGS: Femora III somewhat stouter than in the other dark-winged species, and less densely punctured; coxae III moderately densely punctured, with large, flat-trimmed scopa; coxae II polished with a few, scattered punctures.

WINGS: Nervulus postfurcal; areolet pentagonal, strongly narrowed in front; radius slightly sinuate.

ABDOMEN: Postpetiole without distinct median field, fairly densely and coarsely punctured all over; interspace of gastrocoeli narrower than 1 of them and densely punctured, not striate; tergites 2-4 fairly densely punctured, the 3rd slightly more finely than the 2nd, the 4th more finely than the 3rd.

MALE: Length 16-21 mm. Black; wings slightly less strongly infuscated than in female, particularly their basal part; the following white: mandible except apices, face and clypeus (except a longitudinal percurrent median black band), frontal orbits broadly up to vertex (usually connected with vertical marks), marks on vertical orbits, outer orbits (white band gradually widening close to apex of cheeks), collare, pronotal ridge, subalarum, scutellum, (except narrowly black base), postscutellum, prescutellar carinae, tegulae (partially or entirely), sometimes 2 median longitudinal short stripes on mesoscutum, apex of prosternum, coxae I except base, apex of coxae II, apices of all femora dorsally, all tibiae dorsally for their total length, segments 1-4 of tarsi I and II and usually metatarsus III, all dorsally except their narrow apices; flagellum without annulus; scape ventrally white, rarely postpetiole with median apical white mark.

FLAGELLUM: With 45 to (usually) 50, or 51 segments, and with narrow, elongate-elliptic tyloids on segments 10-23, extremely small, bacilliform ones usually recognizable also on the 9th and 24th to 25th segments, the longest (about on segments 14-20) reaching rather close to bases but not to apices of segments; tyloids beyond the 20th segment gradually becoming smaller, narrower and more bacilliform from segment to segment.

HEAD: Malar space nearly $1/2$ as long as width of mandible base; cheeks and temples somewhat narrower than in female.

THORAX: Area superomedia usually transverse, scutellum on the average, somewhat more raised above postscutellum than in female.

ABDOMEN: Interspace of gastrocoeli and also base of 3rd tergite medially aciculate; median field of postpetiole more distinct than in female; the 5th tergite also distinctly and fairly densely punctured.

DISTRIBUTION (map 13): From Ontario south to Florida and Texas (USNM), west to 100° W. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 22-25-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 1 female, Gold Head Branch State Park, 24-VI-1971, D. Radtke (CGH II). Palm Beach Co.: 3 males, V-1936, in McPhail trap, O. D. Link (FSCA).

9. *Coelichneumon orpheus* (Cresson)

Fig. 14, Map 14

Ichneumon orpheus Cresson, 1864:136, female. Townes and Townes, 1951:303, female.

Coelichneumon orpheus, Heinrich, 1961:61-63 (fig. 11, temple profile), female, male.

Holotype: female, ANS. Neallotype: male, CGH II.

SYSTEMATICS: One of the 6 largest species of the genus in North America; distinguished by moderately infuscated



Map 13. *Coelichneumon viola* (Cresson)

wings; in males scutellum predominantly and pronotal ridge white, in females only about 50% of specimens with apically white-marked pronotum and scutellum; coxae III of females without scopa.

The 2 males recorded from Florida agree completely in structure as well as in color with the neallotype from Maine; they were collected on palmetto blossoms.

FEMALE: Length 20 mm. Black; the following white: frontal orbits narrowly, mark on vertical orbits, small spot on mandible base, collare partially, mark on subalarum, in about 50% of specimens apex of pronotal ridge and of scutellum, extreme apex of femora I and II, and the tibiae I ventrally; flagellum with dorsal white annulus on segments 8 or 9 to 15 or 16.

FLAGELLUM: Bristle shaped, slightly widened beyond middle, attenuated at apex, with 43-44 segments, the 1st somewhat more than twice as long as apically wide, in lateral view about the 11th square, the widest, on the flat side, about 1.3 times as wide as long.

HEAD: Temple profile and cheek profile slightly narrowed behind eyes and toward mandibles, respectively, with curved outlines; malar space slightly less than 1/2 as long as width of mandible base; cheeks and temples convex.

THORAX: Anterior 1/3 of notauli distinct; scutellum slightly convex; area superomedia (fig. 14) nearly as long as wide, slightly narrowed toward area basalis, the anterior bordering carina more or less distinct.

WINGS: Nervulus postfurcal; areolet pentagonal, narrowed in front; radius slightly sinuate. Moderately infuscated, less strongly basally than toward the apex.

ABDOMEN: Median field of postpetiole fairly distinct, striate, apically more or less



Fig. 14. *Coelichneumon orpheus* (Cresson) (female). Propodeum, dorsal view.



Map 14. *Coelichneumon orpheus* (Cresson)

densely punctured; interspace of gastrocoeli narrower than 1 of them, sharply striate; rest of median part of 2nd tergite densely rugose punctate; middle of 3rd tergite likewise striate at base, rugose punctate further on.

MALE: Length 20-22 mm. Black; the following white: mandibles except apex, face and clypeus except longitudinal black median line or median mark on both, lower part of outer orbits, frontal orbits, vertical marks, scape below, collare, pronotal ridge, subalarum, tegulae in part or entirely, scutellum except base, sometimes post-scutellum, often a mark on prepectus laterally, coxae I and II apically, femora I and II ventrally except base, tibiae I and II ventrally, usually basal segments of tarsi I below, scape ventrally.

FLAGELLUM: With 40-44 segments, and with elongate tyloids on segments 8 or 9 to 19 or 20, the longest, on segments 12-18 not quite reaching to bases and apices of segments.

DISTRIBUTION (map 14): Quebec and Maine, south to Florida, west to British Columbia. FLORIDA. Highlands Co.: 2 males, Highlands Hammock State Park, 27-28-IV-1968, G. Heinrich (CGH II).

HOSTS: "Notodontidae pupa" (CNC). *Ecpantheria scribonia* (Stoll).

10 a. *Coelichneumon navus navus* (Say)
Ichneumon navus Say, 1836:229, female, male. Townes and Townes, 1951:303, female, male. Heinrich, 1961:58-59, female, male.

Ichneumon cinctipes Provancher, 1875:22, 51, female. (Synonym according to Townes and Townes 1951:303). Name preoccupied by Retzius, 1783.

Neotype: female, Dryden, Maine, U.S.A., 22-VIII-52; USNM. Neallotype: male, same locality, 30-VIII-1960. USNM.

SYSTEMATICS: The holotype of the species described 142 years ago has been lost and reported so by Heinrich (1961); a neotype is designated here.

One of the smallest species of the genus, only 8-12 mm long; chromatically distinguished by basal white annulus on all tibiae and tarsi, in both sexes, and by black scutellum with lateral white bands.

The southernmost populations of this species display considerably more extensive white markings on head, thorax, and legs in males than northern populations; this geographical variation is much less conspicuous in females which in southern specimens usually show only a slight increase of white on head and on coxae and trochanters I and II.

FEMALE: Length 8-12 mm. White band on orbits narrow and broadly interrupted on temples and on malar space, usually narrowly interrupted also on vertex, sometimes entirely lacking on exterior orbits; clypeus laterally not or very restrictedly marked with white, mandibles black; all femora black, except white apical mark on anterior side of femora I and II; all tibiae with conspicuous basal white annulus, tibiae I white on anterior side; tarsi black, only 1st segment of all tarsi basally extensively white; coxae I and II black, coxae I sometimes restrictedly white marked apically; all 1st trochanters black with whitish apical margin; abdomen uniformly black; flagellum with dorsal white annulus on segments 7-12 or 14.

FLAGELLUM: Moderately long, subbristle shaped, only slightly attenuated apically, somewhat widened beyond middle, with 31-34 segments, the 1st slightly more than twice as long as apically wide, the 9th square, the widest on the flat side nearly twice as wide as long.

HEAD: Temple profile and cheek profile somewhat narrowed behind eyes and toward mandibles respectively, with slightly curved outlines; malar space nearly 1/2 as long as width of mandible base.

THORAX: Mesoscutum densely punctured, finely coriaceous between punctures; scutellum barely convex, less densely punctured, also coriaceous between punctures; anterior

1/4 of notauli fairly distinct; area supero-media usually slightly wider than long and usually confluent with area basalis.

LEGS: Fairly stout; coxae III ventrally finely and very densely punctured, coriaceous between punctures, opaque, with distinct scopa.

ABDOMEN: Postpetiole with well defined median field, which is longitudinally striate, as is also the interspace of gastrocoeli, the middle of 2nd tergite, and medially the base of the 3rd and 4th tergites.

MALE: Length 8-13 mm. Face and clypeus uniformly white, base of mandibles extensively; white band on orbits more extensive than in female, not interrupted, widened over almost entire width of lower section of cheeks; femora black, femora I and II white on anterior side, the latter not completely so; tibiae and tarsi nearly as in female; coxae I and II and all trochanters almost entirely white; flagellum black, scape ventrally white.

FLAGELLUM: With 31-34 segments and with narrow, elongate-bacilliform tyloids on segments 6 or 7 to 15 or 16, the longest not reaching close to bases and apices of segments.

HEAD: Malar space very short, almost 1/4 as long as width of mandible base.

DISTRIBUTION: From Maine, Quebec, and Ontario west to Illinois, south at least to Virginia, probably further.

HOST: *Hyphantria cunea* (Drury).

**10b. *Coelichneumon navus albidior*,
new subspecies
Map 15**

SYSTEMATICS: The majority of specimens of southeastern populations differs from the nominate form in females only slightly; in males, however, considerably by more extensive white markings on head, legs, and on pleura and sterna. The scopa on coxae III of females is denser and more conspicuous in the southern subspecies than in the northern. This subspecies displays a rather wide individual variability, and specimens which approach the nominate form chromatically occur occasionally.

FEMALE: Length 8-12 mm. Black, pronotal ridge, subalarum, and sides of scutellum white; all tibiae and metatarsi with conspicuous white annulus at base, bases of segments 2 or 2 and 3 of all tarsi also narrowly white; white are also: broad band around orbits (narrowly interrupted at malar space only, rarely very narrowly also on

vertex), lateral marks on clypeus, base of mandibles, extreme apices of femora I and II on ventral side, tibiae I ventrally, coxae I and II apically, and all trochanters I, II, and III ventrally (always more extensively than in nominate form); flagellum with white annulus.

MALE: Length 8-13 mm. Black, with very rich white markings on head, thorax, and legs; the following white: clypeus, face, cheeks, orbits broadly around eyes (narrowed on temples), mandibles except teeth, collare, pronotal ridge broadly, pronotal base (except apical part), tegulae, subalarum, scutellum (except apically usually not complete longitudinal median black band), usually post-scutellum, prosternum predominantly, broad longitudinal band or mark on lower 1/2 of mesopleura (extending in front onto prepectus and usually below more or less extensively onto mesosternum), all trochanters and coxae I and II entirely, coxae III partially to entirely, anterior side of femora I and II (the latter except basally), tibiae I and II (except black stripe on posterior side from beyond base to apex), more than basal 1/3 of tibiae III, segments 1-2 of tarsi III and 1-3 of tarsi I and II (all except apices), and all spurs; flagellum without annulus.

Holotype: male, Florida, Highlands Co.: Lake Placid, Archbold Biological Station, 16-V-1967, G. Heinrich. Allotype: female, same data except 3-IV-1968. Paratypes: 3 females, 3 males, same locality, 21-III-26-V-1968; Lee Co.: 1 male, Ft. Myers, 30-III-1968, D. Radtke. KANSAS. 1 female, 1 male, Lawrence, 13-X-1952. All specimens CGH II.

DISTRIBUTION (map 15): From Kansas to Florida. In addition to the type specimens, the following material has been seen: ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 18-26-V-1971, G. Heinrich, D. Shaneck. FLORIDA. Lee Co.: Ft. Myers, 1 male, 30-X-1971, 1 female, VI-1972, D. Radtke. LOUISIANA. Evangeline Co.: 1 male, Eola, 26-III-1972, D. Shaneck. MISSISSIPPI. Yalobusha Co.: 1 female, Water Valley, 15-22-V-1971, M. Horan. All specimens CGH II.

11. *Coelichneumon vitalis* (Cresson)

Map 16

Ichneumon vitalis Cresson, 1877:149, female. Townes and Townes, 1951:303, female.

Coelichneumon vitalis, Heinrich, 1961:53-54, female, male.

Holotype: female, New York; ANS. Neallotype: male, Dryden, Maine; CGH II.



Map 15. *Coelichneumon navus albidior* n. subspecies

SYSTEMATICS: One of the smallest black species of the genus, chromatically distinguished, in both sexes, by the more or less extensively white (except base) scutellum and, in females, by lack of scopa on coxae III and by white orbits almost around eyes. Males have a small dorsal white mark on base of tibiae III. Abdomen usually with slight metallic-blue tinge. This characteristic tinge is, as a rule, distinct in freshly collected specimens, but usually indistinct or absent in old specimens in collections, apparently a matter of gradual fading, possibly also of individual variation.

FEMALE: Length 11-12 mm. Black, abdomen slightly metallic-blue tinged; scutellum white except base; pronotal ridge white; mesoscutum usually with 2 short median white stripes; orbits white almost around eyes; usually also clypeus laterally white marked; white are also: subalarum, collare, and mark on prepectus; coxae III without scopa; flagellum slender, with long basal segments, only moderately widened beyond middle, with white annulus on segments 7-11.

FLAGELLUM: Bristle shaped, distinctly widened beyond middle, moderately attenuated at apex, with 34-35 segments, the 1st barely 2.5 times as long as apically wide, in lateral view the 10th square, the widest, on the flat side, a little more than twice as wide as long.

HEAD: Temple profile distinctly narrowed behind eyes, with curved outline; malar space about $1/2$ as long as width of mandible base. Black; the following white: small marks on sides of clypeus, orbits broadly around eyes (narrowly interrupted usually at vertex, always at malar space, rarely also at temples, widened distinctly on cheeks and lower part of face), and small mark on mandible base.

THORAX: Mesoscutum fairly densely punctured, coriaceous between punctures, subopaque; anterior $1/4$ of notauli distinct, sternauli lacking; area superomedia wider than long, usually weakly bordered in front. Black, the following white: collare, pronotal ridge broadly, subalarum, scutellum except base, usually 2 short longitudinal median lines on mesoscutum, and a lateral mark on prepectus.

LEGS: Fairly slender; coxae III without scopa. Black; white are: apices of coxae I, the tibiae I, and apex of femora I on anterior side; sometimes also apices of coxae II, and trochanters I, or I and II, ventrally in part.

ABDOMEN: Median field of postpetiole, interspace of gastrocoeli, and base of 3rd tergite in the middle longitudinally aciculate, the apex and lateral fields of postpetiole punctured; interspace of gastrocoeli about as wide as 1 of them, or slightly narrower.

MALE: (Specimens from Florida not yet known); as female, except white markings more extensive; in addition to white markings as in female, white are: face, clypeus, mandibles, cheeks extensively, scape ventrally, narrow apical border of femora III, small dorsal mark on base of tibiae III, ventral side of femora I and of apical part of femora II, apical $1/2$ or apex of coxae I and II, trochanters I and II ventrally, tibiae II ventrally, extreme base of tibiae I and II also dorsally, and all spurs.

FLAGELLUM: With 35-36 segments and with narrow bacilliform tyloids on segments 7 or 8 to 18 or 19, the longest not reaching to bases or apices of segments.

HEAD: Malar space about $1/3$ as long as width of mandible base. Black, the following white: mandible except teeth, face and clypeus entirely or except longitudinal median black band, orbits broadly around eyes, interrupted only at malar space, strongly narrowed or interrupted at temples; malar space, apex of cheeks at mandible base and their posterior belt black.

THORAX: Black, the following white: collare, pronotal ridge, tegulae, subalarum, usually 2 median lines on mesoscutum,



Map 16. *Coelichneumon vitalis* (Cresson)

scutellum except base, sometimes post-scutellum, apex of prosternum, often a mark on exterior part of prepectus, and sometimes in southern specimens (2 specimens from Alabama and Georgia in USNM) a longitudinal band on lower $1/2$ of propleura.

ABDOMEN: Interspace of gastrocoeli considerably narrower than 1 of them; aciculation of median field of postpetiole and of middle of tergites 2 and 3 coarser and more extensive than in female; also the 4th tergite medially to about middle aciculate. Color as in female.

DISTRIBUTION (map 16): Maine and New Hampshire south to Florida and Mississippi, west to Utah. **FLORIDA.** Alachua Co.: 1 female, Gainesville, 4-V-1968, G. Heinrich (CGH II). **MISSISSIPPI.** Yalobusha Co.: 1 female, Water Valley, 5-VIII-1970, G. Heinrich (CGH II).

12. *Coelichneumon lisae*, new species Map 17

SYSTEMATICS: A small species, similar in size and appearance and by the lack of scopa to *vitalis*, but, strikingly different by the lanceolate flagellum very strongly widened beyond middle with shorter basal segments.

The color of the abdomen is black, but sometimes in strong light shows a faint

bluish tinge. If the abdominal color is considered as bluish tinged, the species runs in the key for *Coelichneumon* females (Heinrich, 1961) to *neocretatus*, otherwise to *pumilionobilis*; *lisae* differs from these considerably in structure by (1) much shorter basal segments of the flagellum; (2) narrow and considerably longer than wide area superomedian; and (3) by the sculpture of tergites 3 and 4 which are much denser punctured but completely without longitudinal striation in the middle.

Distinguished chromatically by a white mark on exterior side of the base of tibia III and by the white pattern of the scutellum, the white covering its lateral margins (toward apex only or for the entire length) and also the apical margin.

The species is named in appreciation of Mrs. Lisa Hermann's collecting activity which contributed valuable additions to our distributional records.

FEMALE: Length 13-14 mm. Black, the following white: frontal orbits with major part of facial orbits, marks on vertical orbits, medially interrupted mark on collare, extreme apex of pronotal ridge, sometimes mark on subalarum, apical margin of scutellum together with apical part or entire length of lateral margins, anterior side of tibiae and tarsi I, anterior side of tibiae and tarsi II more or less extensively, extreme apex of femora I and II, and a basal mark on exterior side of tibiae III; flagellum with dorsal (nearly complete) white annulus on segments 4 (apex) or 5 to 12, or 13 or 14 (base).

FLAGELLUM: Short, lanceolate, very strongly widened beyond middle, sharply attenuated toward apex, with 38-39 segments, the 1st 1.5 times as long as apically wide, in lateral view the 5th square, the widest on the flat side about 4 times as wide as long.

HEAD: Temple profile moderately narrowed behind eyes, slightly curved; cheek profile only slightly narrowed toward mandible base; malar space shorter than width of mandible base; cheeks fairly strongly convex, smooth and shiny, with scattered, coarse punctures; carina oralis a trifle raised; median field of face slightly protruding; face and clypeus coarsely and fairly densely punctured, coriaceous between punctures; apical margin of clypeus straight; mandibles normal, fairly broad, the upper tooth longer than the lower.

THORAX: Mesoscutum longer than wide, very densely punctured, coriaceous between punctures, slightly shiny; anterior 1/4 of

notauli indicated; scutellum flat, smooth and shiny, moderately densely punctured; propodeum fairly long, the areae dentiparae gently curving downward toward coxae III; carination complete; area superomedia clearly longer than wide, with costulae nearly in the middle, narrowed from costulae toward area basalis, lateral carinae of the latter long and diverging strongly toward narrow basal furrow; densely and coarsely punctate or rugose punctate, the space of area superomedia, area basalis and anterior part of areae superoexternae nearly impunctate; propleura and mesopleura densely punctured, speculum smooth.

LEGS: Femora fairly short; coxae III fairly densely punctured, without scopae.

ABDOMEN: Median field of postpetiole fairly distinct, flat, with irregular, scattered puncturation, not longitudinally striate; gastrocoeli moderately deep, much narrower than their interspace, the latter longitudinally striate, at the most to the middle of 2nd tergite, usually less extensively; rest of the surface of the 2nd tergite and the entire 3rd or 4th tergite very densely and moderately strongly punctured, without striae; ovipositor slightly projecting.

MALE: The male described below is the only 1 representing undoubtedly an unknown species; it was found sympatric with *lisae*, female, in Tennessee, and it matches *lisae* in size; these facts suggest the association of the sexes; against this can be held that the median field of the postpetiole of the male under discussion is longitudinally striate instead of irregularly punctured (as in the holotype) and that the white markings are much more extensive than in the female; both types of differences are within the limits of sexual dimorphism occurring in the genus *Coelichneumon*. The association, however, still needs further confirmation. The male is uniquely characterized by a short row of unusually large tyloids.

Length 12 mm. Black; head, thorax, and legs with rich white markings, abdomen and flagellum uniformly black; the following white: face, clypeus, mandibles, frontal orbits up to vertex (the white band widened below level with lower ocellus), cheeks (except malar space and black band along mandible base), collare, pronotal ridge, pronotal base, subalarum, tegulae, 2 short, apically converging median lines on mesoscutum, scutellum (except base laterally), all trochanters I, II and III (except 1st trochanters III basally black), coxae I and II apically extensively, apices and anterior side of femora I and II (except black base of

femora II), tibiae I basally all around and entire length of anterior side, tibiae II all around to about middle and on anterior side close to apex, tibiae III all around slightly to beyond middle, metatarsi I-III except black apices, and scape below.

FLAGELLUM: With 31 segments and with conspicuous, unusually large, elongate-oval tyloids on segments 5-10, reaching from bases to apices of segments; segments 3 and 4 also with indication of elongate tyloids.

HEAD: Temple profile moderately narrowed behind eyes, with nearly straight outline; cheek profile narrowed toward mandible base; mandibles narrow, the subapical tooth short.

THORAX: Mesoscutum densely and fairly coarsely punctured, longer than wide, convex; anterior 1/3 of notauli indicated; scutellum convex, laterally carinate at base; carination of propodeum complete; area superomedia about as long as wide, with costulae in the middle.

ABDOMEN: Median field of postpetiole and interspace of gastrocoeli longitudinally striate; gastrocoeli rather narrow, each considerably narrower than the interspace; hypopygium short and blunt.

Holotype: female, Arkansas, Garland Co., Ouachita State Park, 22-V-1972, G. Heinrich (CGH II). **Allotype:** male, Tennessee, Henderson Co., Natchez Trail State Park, 18-23-VI-1972 (CGH II). **Paratypes:** 1 female, same data as holotype except collected 17-22-V-1972; 1 female, Louisiana, Bistineau State Park, 3-6-V-1972, G. Heinrich, D. Shaneck (all CGH II).

DISTRIBUTION (map 17): Arkansas, Louisiana, and Tennessee, as outlined above.

13. *Coelichneumon azotus* (Cresson)

Map 18

Ichneumon azotus Cresson, 1864:150, male. Townes and Townes, 1951:303, female, male.

Ichneumon agnitus Cresson, 1864:151, female.

Coelichneumon azotus, Heinrich, 1961:62, 74, 76-77, female, male, fig. 18.

Holotype: *Ichneumon azotus*, male, Delaware; ANS. *Ichneumon agnitus*, female, Delaware, ANS.

SYSTEMATICS: The species *azotus* typifies a group of at least 6 North American species of the genus, all of which are clearly distinguished by: (1) reduction of striate sculpture on tergites with the postpetiole being punctured instead of aciculate (as is the rule) and (2) broad mandibles, with strongly developed subapical tooth, the 2 teeth being



Map 17. *Coelichneumon lisae* n. sp.

separated from each other by a wide gap. The group could well be considered as a distinct genus. Four species of the *azotus* group are recorded from Florida; the decisive differences from *azotus* of each of these 4 species will be discussed in their respective systematic treatments.

The short series of specimens from Florida shows no tangible individual variation nor geographical differentiation from a series from Maine. Canadian males often are known to have strongly reduced or even to lack white pattern on tibiae and tarsi III.

FEMALE: Length 15-16 mm. Black; head, thorax, legs I, and sometimes postpetiole with restricted white pattern; the following white: small lateral marks on clypeus, orbits around eyes (the white band narrowly interrupted on vertex, more widely on lower end of eyes), collare, subalarum, pronotal ridge, at least apical 1/2 of scutellum, anterior side of tibiae I, tip of femora I or I and II, and sometimes an apical mark on postpetiole; flagellum with dorsal white annulus on segments 7-14.

FLAGELLUM: Moderately long, bristle shaped, ventrally flattened and slightly widened beyond middle, moderately attenuated toward apex, with 39-41 segments, the 1st fully twice as long as wide, in lateral view the 9th square, the widest on the flat side not quite twice as wide as long.

HEAD: Temple profile in vertical view scarcely narrowed behind eyes, strongly curved; cheek profile in frontal view as in *jejunos* Cresson, scarcely narrowed toward

mandible base, distinctly curved; cheeks in lateral view wide and strongly convex; carina genalis subparallel, with posterior margin of eye to carinal junction, which is very close to mandible base; carinal junction not at all elevated and not forming a small, triangular projection as it does in *jejunos*; apical margin of clypeus, in contrast to *jejunos*, completely normal and straight, without a trace of emargination or bisinuation; mandibles as described in systematics.

THORAX: About anterior 1/4 of notauli fairly distinct; mesoscutum moderately densely punctured, finely coriaceous between punctures, the scutellum more glossy, with only a few scattered punctures, a trifle convex, with sharp lateral edges at the extreme base; area superomedia, more often than not, separated from area basalis, either square or slightly wider than long, sometimes approaching horseshoe shape, with costulae beyond middle; lateral carinae of area posteromedia indistinct.

LEGS: Femora moderately stout, coxae III coarsely and rather densely punctured, with conspicuous gray scopa.

ABDOMEN: Postpetiole usually coarsely and densely punctured all over, without trace of striation or rugosity on the median field, which is fairly clearly delimited; interspace of gastrocoeli striate; tergites 2 and 3 moderately densely and fairly coarsely punctured, extremely finely coriaceous between punctures, and distinctly shiny; 4th tergite less densely and markedly finer punctured.

MALE: Length 14-18 mm. Rather similar to *jejunos*; black; the following white: mandibles predominantly, face, clypeus, orbits around eyes broadly (interrupted at malar space and usually at vertex), collare, pronotal ridge, subalarum, tegulae, scutellum, postscutellum, usually 2 short median lines on mesoscutum, broad apical band on postpetiole, legs I and II on anterior, coxae and trochanters I and II on ventral side for almost the whole length, apices of femora III dorsally, tibiae and tarsi III dorsally for entire length or almost so; scape ventrally white, flagellum without annulus, toward ventral apex usually dull brownish tinged.

FLAGELLUM: With 39-40 segments; with very small, short, narrowly-oval tyloids on segments 8-16, the longest on about segments 12-15 covering only slightly more than the median 1/3 of segments; a punctiform tyloid on segments 7 and 17 sometimes recognizable.

HEAD: Structure generally as in female, but mandibles still wider, and markedly stouter and wider than in *jejunos* males; malar space very short, about 1/4 as long as width of mandible base; in contrast to *jejunos* no angular projection at carinal junction.

THORAX: Structure generally as in female; scutellum more raised above postscutellum than in female, markedly more so and more convex than in *jejunos* male, laterally carinate at the very base; area superomedia wider than long, distinctly wider than in *jejunos*, usually separated from area basalis; in contrast to *jejunos* postscutellum apparently always white.

LEGS: White markings much more extensive than in *jejunos*, particularly on legs III; the following white: coxae I and II except bases, 1st trochanters I and II except dorsal black stripe, all femora dorsally at apex, femora I and II also on entire anterior side except narrowly black bases, all tibiae and tarsi dorsally, except usually black apex to sometimes apical 1/3 of tibiae III and usually segments 5 or 4 and 5 of tarsi III; coxae, trochanters, and (except apices) femora III, always entirely black; apices of dorsally white tarsal segments narrowly blackish.

ABDOMEN: Median field of postpetiole clearly defined, coarsely (more or less densely) punctured, without aciculation or rugosity; interspace of gastrocoeli shortly and strongly aciculate; sculpture of tergites 2 and 3 similar to *jejunos* although slightly coarser and denser, the sculpture of tergites 4 and 5, however, markedly coarser than in *jejunos*, coarsely and rather densely punctured.

DISTRIBUTION (map 18): From Quebec, Maine, and Ontario south to Florida, Mississippi, and Kansas. **ARKANSAS.** Garland Co.: 1 male, 2 females, Ouachita State Park, 9-28-V-1972, G. Heinrich, D. Shaneck (CGH II). **FLORIDA.** Duval Co.: 1 female, Jacksonville, 8-V-1971, C. F. Zeiger. Highlands Co.: 1 female, 4 males, Archbold Biological Station, ?-V-20-VI-1967, G. Heinrich. 2 males, Highland Hammock State Park, VIII-1969, G. Heinrich. Hillsborough Co.: 1 male, Hillsborough River State Park, 7-VI-1970, G. Heinrich (all CGH II). Lake Co.: 1 female, 10-V-1956 (CHT). Lee Co.: Ft. Myers, 1 male, 20-VIII-1969, 7 males, IV-V-1970, D. Radtke (CGH II). **MISSISSIPPI.** Yalobusha Co.: 3 males, Water Valley, 11-27-V-1971, M. Horan (CGH II). **TENNESSEE.** Henderson Co.: 2 females, Natchez Trail State Park, 1-12-VI-1972, G. Heinrich, D. Shaneck (CGH II).

ECOLOGY: Deciduous forests.



Map 18. *Coelichneumon azotus* (Cresson)

14. *Coelichneumon jejunos* (Cresson)

Fig. 15-17, Map 19

Ischnus jejunos Cresson, 1864:186, male. Townes and Townes, 1951:303, female, male.

Ichneumon apertus Cresson, 1867:293, female.

Coelichneumon jejunos, Heinrich, 1961:73-74, female, male, and figs. 26, 28, 30.

Coelichneumon duffieldi Heinrich, 1971:965-966, female (new synonymy).

Holotypes: *Ischnus jejunos*, male, Illinois; ANS. *Ichneumon apertus*, female, Illinois; ANS. *Coelichneumon duffieldi*, female; CGH II.

SYSTEMATICS: In Florida, at least during the years 1967-1970, the only common species of this genus. In color similar to *azotus* Cresson, but unmistakably distinguished in both sexes by the combination of 2 characters: (1) junction of carina oralis and carina genalis somewhat elevated, forming a small, triangular projection, well visible in lateral view of the slightly toward mandibles tilted head (fig. 15-16); (2) mandibles stout, the teeth separated by a wide gap, the upper tooth, however, markedly longer than the lower (fig. 17). Coxae III of females without trace of scopa.

A recent reexamination of the holotype of *Coelichneumon duffieldi* has revealed that the wide gap between the mandible teeth was covered with some sticky material and so hidden from view; the specimen described as a new species belongs to *jejunus*.

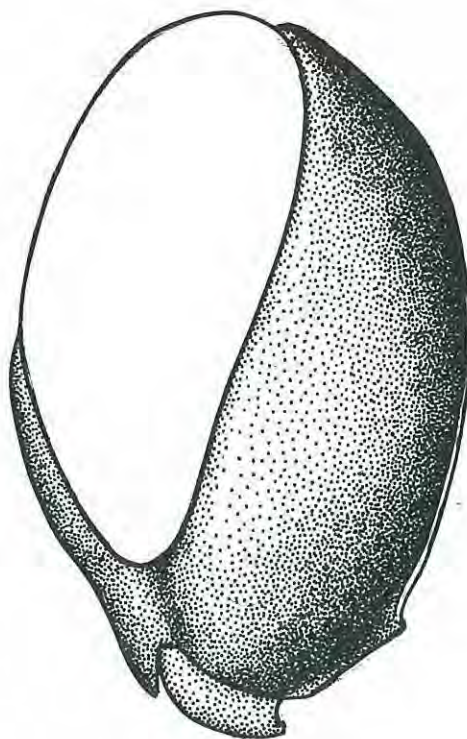


Fig. 15. *Coelichneumon jejunos* (Cresson) (female). Head, lateral view.

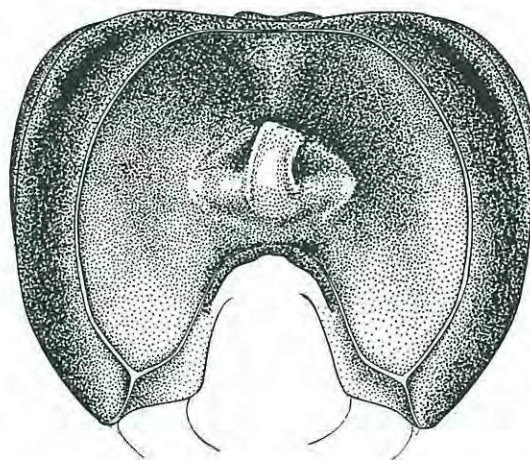


Fig. 16. *Coelichneumon jejunos* (Cresson) (female). Head, posterior view.

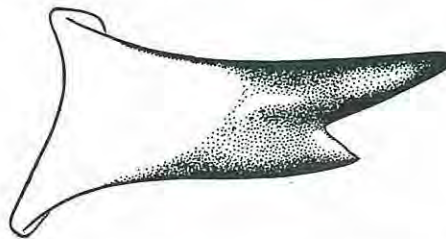


Fig. 17. *Coelichneumon jejunos* (Cresson) (female). Mandible, frontal view.

The species *jejunos* displays a rather wide range of individual variability in structure of the cheeks as well as in the extent of white pattern. Tables 3 and 4 illustrate the chromatic variability of both sexes. A female collected near Ft. Myers, Florida, shows unusually strongly swollen cheeks, but also seems, nevertheless, to represent *jejunos*.

FEMALE: Length 13-15 mm. Black, head, thorax and legs I with restricted white markings as follows: orbits from upper end of face or slightly above level of antennal sockets up to vertex and down again on posterior side of eyes to about or beyond their middle, with or without narrow interruption on vertex and/or on temples, collare, mark on subalarum, pronotal ridge (varying in extent from apically only to entire length), usually apical 1/3 of scutellum or less (sometimes scutellum entirely black), anterior side of tibiae I; flagellum with dorsal white annulus on segment 6, or (more often) apex of 6 to 13 or 14.

FLAGELLUM: Moderately long, bristle shaped, ventrally flattened and widened beyond middle, moderately attenuated toward apex, with 38-41 segments, the 1st nearly 2.5 times as long as apically wide, in lateral view the 9th square, the widest on the flat side more than twice as wide as long.

HEAD (fig. 15, 16): Temple profile, in dorsal view, slightly widened beyond eyes rather than narrowed, with strongly curved outline; cheek profile in frontal view wide and strongly convex; carina genalis gradually slightly diverging from posterior margin of eyes toward carinal junction (which is situated at a distance nearly equal to the width of mandible base before the latter) then turns in an angle abruptly toward base of mandibles; carinal junction elevated and projecting as described in systematics; clypeus with very slightly bisinuate apical margin and with rounded sides; mandibles as shown in fig. 17.

THORAX: About anterior 1/4 of notauli fairly distinct; mesoscutum coarsely and not very densely punctured, shiny between punctures; scutellum flat, slightly less coarsely punctured than mesoscutum; areae dentiparae long and rather narrow, more than twice as long as costulae; area superomedia distinctly longer than wide, usually confluent with area basalis, with costulae beyond middle; lateral carinae of area posteromedia usually obsolete, sometimes also lateral carinae of area basalis and of anterior part of area superomedia.

LEGS: Femora moderately stout, densely punctured; coxae III coarsely and rather densely punctured, without scopa.

WINGS: Nervulus strongly postfurcal.

ABDOMEN: Median field of postpetiole not densely and strongly aciculate as usually in this genus, but finely, irregularly rugose, with some coarse puncturation, the lateral fields and the petiole usually more densely, coarsely punctured; gastrocoeli fairly deep, with large thyridia, their interspace not quite as wide as 1 of them, irregularly longitudinally rugose punctate; tergites 2 and 3 coarsely and moderately densely punctured, extremely finely coriaceous, and distinctly shiny between punctures, the 4th tergite slightly less densely and less coarsely punctured.

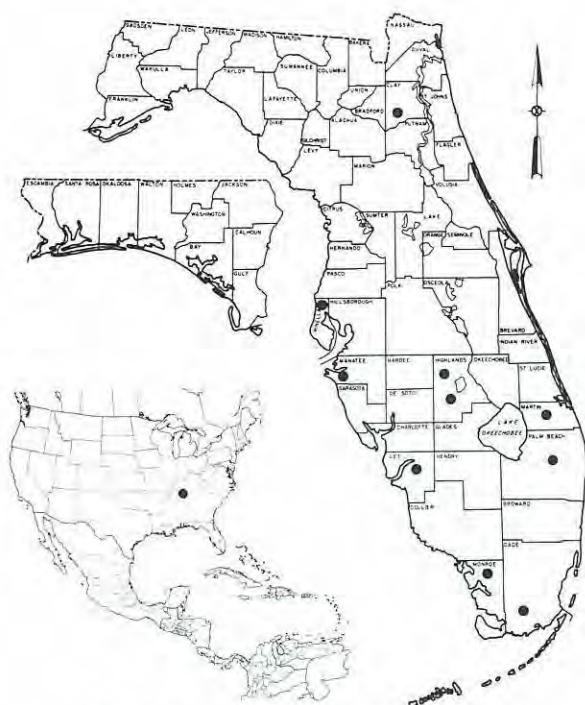
MALE: Length 11-16 mm. Black; the following white: always face and clypeus, orbits around eyes extensively except interrupted on malar space, often also narrowly on vertex, rarely on temples, collare, pronotal ridge, subalarum, tegulae, scutellum, legs I and II more or less extensively, and (in majority of specimens) 2 short, median lines on mesoscutum and the base of tibiae III dorsally more or less extensively; rarely white are: a lateral mark on prepectus, marks on prescutellar carinae, and postscutellum; flagellum without annulus, ventrally toward apex usually dull brownish tinged; scape ventrally white; (see also table for the distribution of white markings on 30 males from Florida).

FLAGELLUM: With 35-39 segments and with approximately bacilliform tyloids on segments 7 to 18 or 19, the longest on segments 11-16, reaching fairly close to the apices but not close to the bases of segments.

HEAD: Structure generally as in female including mandibles; malar space very short, about 1/3 as long as width of mandible base; the small, triangular projection at carinal junction as distinct as in female.

THORAX: Structure generally as in female; scutellum slightly convex.

LEGS: Legs III always black including coxae and trochanters, with only base to about median 1/2 of tibiae III dorsally white, sometimes mark on base of tibiae III very restricted or not quite distinct; all parts of legs I and II usually more or less extensively white marked including coxae, 1st trochanters, and tarsi, the tibiae I and II always entirely white, except ventrally; extent of white on dorsal side of tarsi I and II and on



Map 19. *Coelichneumon jejunos* (Cresson)

ventral side of coxae, trochanters, and femora II and III variable, rarely coxae and trochanters II entirely black; for further details see table 3 for distribution of white on 30 males from Florida.

ABDOMEN: Sculpture of tergites coarser and denser than in female; median field of postpetiole, and particularly interspace of gastrocoeli, more distinctly aciculate.

DISTRIBUTION (map 19): Atlantic to 100° W from Ontario and Quebec, south to Florida; rare in the most northern parts of the range, common in Florida. FLORIDA Clay Co.: 2 males, 2 females, Gold Head Branch State Park, 21-27-IV-1971, G. Heinrich, D. Radtke (CGH II). Dade Co.: 2 females, 5 males, Paradise Key, 6-12-IV (CHT). Highlands Co.: Archbold Biological Station, 9 males, V-1967, 41 males, 6 females, III-V-1968, 1 female, VI-1970, G. Heinrich (CGH II). Highlands Hammock State Park, 5 males, IV-1968, 1970, G. Heinrich, 8 males, 1-8-IV-1970, R. W. Miller (CGH II). Lee Co.: 30 females, 54 males, 14-VI, G. Heinrich, D. Radtke (CGH II). Manatee Co.: 1 male, Bradenton, 10-IV-1964 (FSCA). Martin Co.: 1 male, VI. Monroe Co.: 1 male, XII. Palm Beach Co.: 1 male, Palm Beach, V (all FSCA). Pinellas Co.: 1 male, Tarpon Springs, III. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 5-10-VI-1972, G. Heinrich, D. Shaneck (CGH II).

ECOLOGY: Deciduous, dry forest, apparently with preference for stands of oak trees.

Table 3. Distribution of white markings on 30 males of *Coelichneumon jejunos* (Cresson) from Ft. Myers and Lake Placid

No. specimens	Distribution of white
30	mandible base more or less extensively
30	clypeus
30	face
4	black transverse stripe between face and clypeus
17	orbits around eyes broadly, except only on malar space
13	white on orbits also narrowly interrupted on vertex
3	white on orbits also narrowly interrupted on temples
30	scape ventrally
30	collare
30	pronotal ridge
30	subalarum
30	tegulae
30	scutellum
28	2 short median lines on mesoscutum
10	postscutellum
1	marks on prescutellar carinae
1	lateral marks on prepectus
30	tibiae I and II except on ventral side
22	about basal 1/2 or 1/3 of tibiae III dorsally
4	only extreme base of tibiae III dorsally
4	white on base of tibiae III only faintly indicated
20	anterior side of femora I and II except base
10	less than apical 1/2 of femora I and II anteriorly
14	coxae I and II ventrally extensively
2	coxae I ventrally only very restrictedly
14	coxae II ventrally only very restrictedly
2	coxae II entirely black

(continued next page)

Table 3 continued

No. specimens	Distribution of white
20	1st trochanters I and II ventrally predominantly
2	1st trochanters I ventrally only restrictedly
6	1st trochanters II ventrally only restrictedly
2	1st trochanters II entirely black
2	more than segments 1-3 of tarsi I dorsally
4	segments 1-3 of tarsi I dorsally
23	segments 1-2 of tarsi I dorsally
1	only segment I of tarsi I dorsally
6	segments 1-2 of tarsi II

Table 4. Distribution of white marks on 24 females of *Coelichneumon jejunos* (Cresson) from Ft. Myers and Lake Placid

No. specimens	Distribution of white
24	orbits narrowly from shortly below or shortly above level with antennal sockets up to vertex and down beyond to about middle or beyond middle of outer margins of eyes, with or without narrow interruption on vertex and/or on temples
21	white on orbits narrowly interrupted on vertex
19	white on orbits narrowly interrupted on temples
24	collare
24	subalarum more or less extensively
15	pronotal ridge in whole length or nearly so
9	apex of pronotal ridge only
5	about apical 1/3 of scutellum
14	only extreme apex of scutellum
5	scutellum entirely black
24	anterior side of tibiae I
18	dorsal annulus of flagellum on segments 6 (or apex of 6) to 13 or 14
6	dorsal annulus of flagellum on segments 7 to 13 or 14

15. *Coelichneumon punctifer* Heinrich
Map 20

Coelichneumon punctifier Heinrich, 1961:77-78, female, male.

Holotype: female, Maryland, Mayo Beach; USNM. Allotype: male, Virginia, Nelson Co.; CGH II.

SYSTEMATICS: A 3rd species of the *azotus* group, agreeing with *azotus* in the stout mandibles with gaping, subequal teeth, in the punctured postpetiole, and in the distinct scopa on coxae III.

Distinguished uniquely in males by a strongly elongate hypopygium, approaching the structure of some *Spilichneumon* species; characterized in both sexes by uniformly white prescutellar carinae; flagellum of females less widened than in *azotus*.

FEMALE: Length 14-17 mm. Black, the following white: frontal orbits (the white band markedly widened at level with lower ocellus), orbits of temples and vertex, collare, pronotal ridge broadly, subalarum, prescutellar carinae, apex of scutellum, postscutellum, usually 2 narrow, parallel, short lines on mesoscutum, apical mark on ventral side of femora I, usually also of femora II, anterior side of tibiae I, and sometimes lateral marks on apex of postpetiole; flagellum with dorsal white annulus on segments 7-12 or 13.

FLAGELLUM: Bristle shaped, slightly widened beyond middle and attenuated at apex, with 38-42 segments, the 1st slightly more than twice as long as apically wide and a little longer than the 2nd, in lateral view the 11th square, the widest on the flat side 1.3 to nearly twice as wide as long.

HEAD: Temple profile not narrowed behind eyes, strongly curved, cheek profile slightly narrowed toward mandible base, slightly curved; malar space about 1/2 as long as width of mandible base; cheeks in lateral view broad, convex, almost smooth, with only a few, scattered punctures; face and clypeus very finely coriaceous, with sparse puncturation; mandibles short and broad, with strong teeth, separated by a wide gap, upper tooth somewhat longer than the lower.

THORAX: Notauli indicated only at the extreme base; mesoscutum moderately densely and fairly strongly punctured, finely coriaceous between punctures; scutellum sparsely punctured, shiny, with sharp lateral edges at base; area superomedia not clearly separated from area basalis, the latter not deepened, except the narrow basal furrow. Apical white mark on scutellum medially

emarginate along anterior border, not protruding anteriorly as in *azotus*.

LEGS: Femora stout; coxae III ventrally coarsely and very densely punctured, with conspicuous, pale gray scopa.

ABDOMEN: Median field of postpetiole fairly well defined, without striation, more or less densely punctured; interspace of gastrocoeli longitudinally striate; tergites 2 and 3 coarsely punctured, the middle densely, the sides more sparsely; 4th tergite finely punctured.

MALE: (Description based on south-eastern material). Length 14-18 mm. Black, the following white: base of mandibles extensively, face and clypeus entirely, broad band on orbits around eyes (always interrupted on malar space, usually also narrowly on vertex, strongly widened on upper frons at level of lower ocellus, and also widened on lower outer orbits over entire width of cheeks, (except black band on mandible base) collar, pronotal ridge broadly, subalarum, tegulae, 2 short, apically converging, median lines on mesoscutum, scutellum except base, postscutellum, prescutellar carinae entirely, apico-lateral marks on postpetiole, often also apical mark on its median field, sometimes also apico-lateral marks on 2nd tergite, coxae I and II extensively on ventral side, rarely a small apical mark on ventral side of coxae III, ventral side of femora I and II except basally, anterior side of tibiae I and II, tibiae III on exterior side, at least the basal 1/3, usually to middle or beyond, tarsi I and II laterally more or less extensively, rarely also tarsi III on exterior side in part; flagellum without annulus; scape ventrally white.

FLAGELLUM: With narrow, nearly bacilliform tyloids on segments 7 or 8 to 17 or 18, the longest not reaching close to bases and apices of segments but covering more than their median 1/2.

HEAD: Malar space nearly 1/2 as long as width of mandible base; frons very coarsely rugose punctate; cheeks broad and strongly convex.

THORAX: Anterior 1/4 of notauli rather distinct; area superomedia wider than long, narrowed toward area basalis.

ABDOMEN: Hypopygium strongly produced medially, with blunted apex, finely coriaceous, pilose, and densely punctured all over; median field of postpetiole coarsely punctured and, somewhat irregularly, longitudinally rugose striate.

DISTRIBUTION (map 20): From New York and Virginia south to Florida, west to Texas. FLORIDA. Clay Co.: Gold Head



Map 20. *Coelichneumon punctifer* Heinrich

Branch State Park, 1 female, 6-V-1971, 2 males, 24-VI-1971, 1 female, 2 males, 3-5-VIII-1972, G. Heinrich, D. Radtke (CGH II). Leon Co.: 1 female, Tall Timbers Research Station, Tallahassee, 11-VI-1970, G. Heinrich (CGH II). LOUISIANA. Evangeline Co.: 1 male, Bayou Chicot, 23-III-5-IV-1972, D. Shaneck (CGH II). MISSISSIPPI. Lafayette Co.: 1 female, Oxford (CGH II). Yalobusha Co.: 1 male, Water Valley, 13-27-VII-1970, M. Horan (CGH II). TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 1-6-VI-1972, G. Heinrich, D. Shaneck (CGH II). TEXAS. 1 male, Paris, 1904 (USNM).

16. *Coelichneumon pseudowalleyi*, new species Map 21

SYSTEMATICS: This species, the 4th of the *azotus* group, is closely related to *azotus*, but markedly smaller; in females readily recognizable by the complete lack of a scopa on coxae III, by the uniformly white scutellum, and by the lack of indication of sharp lateral edges at the base of the scutellum. Extremely similar to *walleyi* Heinrich in the small size and lack of a scopa; differing from that species in females mainly by the completely white scutellum and, in direct comparison, by markedly wider mandibles with longer apical teeth, separated from each other by a wider and deeper gap; distinguished from *walleyi* in addition by distinct anterior bordering carina of area

superomedia, a trifle wider temple profile, and somewhat stouter femora III. The males differ from *walleyi* by black tarsi III and entirely or predominantly black trochanters I and II, also, in direct comparison, by slightly stouter femora III.

The male collected at the same locality as the female and in all probability associated with it, differs from *azotus* by: (1) entirely white scutellum, without a trace of lateral edges at the base; (2) comparatively slightly shorter and wider mesoscutum; (3) lack of white marks on postpetiole and on mesoscutum; (4) comparatively shorter femora III; (5) much smaller size. The white markings on legs III are reduced to apical margin of femora III and to a short line on base of exterior side of tibiae III, which covers only about 1/4 of the total length of the tibia; the tarsi III are black.

FEMALE: Length 12-13 mm. Black; the following are white: orbits around eyes (interrupted on malar space and narrowly on vertex), small lateral spots on clypeus, collare, pronotal ridge, subalarum, scutellum, sometimes postscutellum, the anterior side of tibiae I, and small apical marks on anterior side of femora I; flagellum with dorsal white annulus on segments 7-13.

FLAGELLUM: Moderately long, bristle shaped, ventrally flattened and somewhat widened beyond middle, moderately attenuated toward apex, with 35-36 segments, the 1st fully twice as long as apically wide, in lateral view the 7th square, the widest on the flat side nearly 2.5 times as wide as long.

HEAD: Punctuation of frons and cheeks sparser and finer than in *azotus*, the lower cheeks polished between punctures.

THORAX: Mesoscutum and scutellum comparatively somewhat wider and shorter than in *azotus*; scutellum laterally at base without a trace of sharp edges and entirely white. Otherwise structure, sculpture, and color as in *azotus*.

LEGS: Femora III somewhat shorter and thicker than in *azotus*, the coxae III without trace of scopa. Otherwise as in *azotus*.

ABDOMEN: Postpetiole more sparsely punctured than in *azotus*, its base smooth and impunctate, its apex without white marks. Otherwise as in *azotus*.

MALE: Length 13 mm. Black, the following white: mandibles predominantly, orbits around eyes broadly (the white band interrupted at malar space and on vertex, widened on cheeks, but not reaching carina genalis or mandible base), collare, pronotal ridge, subalarum, tegulae, scutellum, sometimes postscutellum, legs I and II on anterior side

(except black bases of femora), apex of femora III dorsally, basal 1/4 of tibiae III on exterior side, coxae I and II extensively, mark on ventral side of 1st trochanters I, and ventral side of scape.

FLAGELLUM: With 38 segments and with narrow, short tyloids on segments 7-16, the longest on segments 9-13, covering nearly median 1/2 of segments.

Holotype: female, Florida, Highlands Co., Highlands Hammock State Park, 13-IV-1970, G. Heinrich. **Allotype:** male, same data. **Paratypes:** 1 female, same data except 13-20-IV-1970. All specimens in CGH II.

DISTRIBUTION (map 21): Central Florida as outlined above.

17. *Coelichneumon delirops*, new species Map 22

SYSTEMATICS: A sympatric female possibly associated with the males recorded below has not been found so far. These males represent without doubt 1 and the same quite distinct form, which is similar chromatically and in structure to *Ichneumon deliratorius cinctitarsis* Provancher (the Nearctic subspecies of the Palaearctic species *deliratorius* Linnaeus). There are, however, several important and constant differences from *deliratorius* in color pattern as well as in morphology, which render a subspecific relation with the latter species unlikely. The new form is treated, therefore, as a distinct species, but the definite confirmation of its status will depend upon discovery of the female.



Map 21. *Coelichneumon pseudowalleyi* n. sp.

Males are, on the average, smaller than *deliratorius cinctitarsis* and differing in structure by (1) shorter and a little wider tyloids; (2) comparatively shorter, less narrowed toward apex and apically broadly truncate scutellum; (3) less densely and less coarsely sculptured tergites 3 and 4, which are not opaque but, particularly on lateral areas, shiny between punctures; and (4) by practically rhomboidal areolet, with intercubiti almost coalescent in front. The chromatic differences are even more marked; the most important ones are: (1) orbits broadly white almost all around eyes (instead of black, except only face white); (2) collare and apical part of pronotal base white (instead of black); (3) tibiae III white close to apex on exterior side, black except basally on interior side (instead of white all around to beyond middle, the rest black all around).

MALE: Length 13-14 mm. Black, with very rich white pattern; abdomen uniformly black; the following white: orbits broadly around eyes (interrupted more often than not narrowly on malar space and more broadly on temples, widened on lower part of cheeks usually to carina genalis and also somewhat widened usually on vertex and below ocellar region), collare, pronotal ridge, lower 2/3 (or less) of pronotal base, subalarum, tegulae, scutellum, postscutellum, usually apex of prosternum, always 2 median marks on apex of mesosternum, often a band or mark on prepectus, sometimes a line along area of sternauli and another line or irregular mark on mesopleura, usually hind upper corner of mesopleura, coxae, trochanters and tarsi I and II entirely, apical mark on ventral side of coxae III, almost always also a narrow basal mark on ventral side of coxae III (rarely a continuous band from base to apex of ventral side of coxae III or a mark on their dorsal side), ventral side of 1st trochanters III, 2nd trochanters III entirely or only ventrally, entire anterior side and apices of femora I and II, tibiae I and II except long, wedge-shaped black line on their posterior side reaching from apex to or beyond middle, tibiae III except black apex and except black posterior side from apex close to base, and segments of tarsi III basally in from segment to segment decreasing extent; scape ventrally to predominantly white.

FLAGELLUM: With 38 segments and with short, narrowly-oval tyloids on segments 5-16 or 17, the longest covering less than median 1/2 of length of segments.

HEAD: Temple profile moderately narrowed behind eyes, with (in contrast to *deliratorius cinctitarsis*) slightly curved

outline; malar space very short, about 1/3 as long as width of mandible base; mandibles fairly narrow, with short subapical tooth, separated from the apical tooth only by a notch.

THORAX: Mesoscutum convex, densely punctured, finely coriaceous between punctures; about anterior 1/3 of notauli fairly distinct; scutellum slightly raised above postscutellum, short, apically broadly truncate, laterally not carinate; propodeum with complete carination.

LEGS: Femora moderately stout.

ABDOMEN: Median field of postpetiole fairly finely and somewhat irregularly longitudinally striate; interspace of gastrocoeli slightly wider than 1 of them, and strongly longitudinally striate; base of 3rd tergite in the middle also with short striation; rest of median part of 2nd or 3rd tergites densely rugose punctate, the lateral parts of tergites 2 and 3 moderately strongly and not very densely punctured, very finely coriaceous and somewhat shiny between punctures.

Holotype: male, Mississippi, Lafayette Co., Water Valley, 11-27-V-1971, M. Horan. **Paratypes:** 6 males, same data as holotypes except 6-27-V-1971; 1 male, same state, Oktibbeha Co., 1-7-V-1971, C. Sartor. **GEORGIA.** 1 male, Chattahoochee State Park, 19-V-1970. All specimens in CGH II.

DISTRIBUTION (map 22): Georgia and Mississippi as detailed above.



Map 22. *Coelichneumon delirops* n. sp.

II. Tribe Ichneumonini Ashmead

Ichneumonini Berthoumieu, 1894:245.

(Partim; name used for the entire subfamily Ichneumoninae)

Ichneumonini Ashmead, 1895:279.

Amblytelini (Viereck), Townes, 1944:319.

Type genus: *Amblyteles* Wesmael.

Joppini (Kriechbaumer), Townes et al.

Type genus: *Joppa* Fabricius.

Ichneumonini, Heinrich, 1967:485; Walkley, 1967:138.

Type genus: *Ichneumon* Linnaeus (= *Pterocormus* Townes).

The tribe is distinguished from the Protichneumonini and from the Trogini by the structure of the propodeum, which is of the "broken" type, that is: divided into clearly separated horizontal and declivous parts, meeting at an angle at the carinae dentiparae interiores and the posterior carina of the area superomedia, the areae dentiparae thus not arching downward close to the base of coxae III, their apices tending to be pointed, sometimes even forming apophyses. The Ichneumonini differ by the petiole not being wider than high from the Platylabini; from the Listrodromini by face, clypeus, and malar space not forming together a single continuous, slightly convex plane, without sutures, depressions or elevations; from the Phaeogenini by the spiracles of the propodeum not being circular but longer than wide, usually slit shaped.

DISTRIBUTION: World-wide. The rather heterogenous multitude of genera assembled under this tribe has been subdivided by Heinrich (1967-1968) for the African and Holarctic fauna in 5 subtribes, of which 4 occur in North America, but only 3 are recorded so far from Florida.

Key to the North American subtribes of the tribe Ichneumonini (Ashmead)

1. Apex of abdomen of females amblypygous; thyridia obsolete or inconspicuous and gastrocoeli indistinctly, or, at the most, moderately impressed. (Areolet pentagonal, the intercubiti widely separated in front; median field of postpetiole aciculate, or sometimes punctured or rugose; sternites tend to be strongly sclerotized in most genera, plica consequently often restricted to 2nd or 2nd and 3rd sternites, sometimes lacking; hypopygium of males often projecting; clypeus always normal)
..... B. Amblytelina (Viereck) (p.)

- Apex of abdomen of females oxygygous or thyridia conspicuous and gastrocoeli distinct 2

2. Clypeus distinctly convex in longitudinal and in transverse direction; scutellum extremely raised above postscutellum but not, or indistinctly, laterally carinate. (Propodeum with very strong apophyses; areolet pentagonal, the intercubiti widely separated in front) (so far no species recorded from Florida).

..... C. Hoplismenina Heinrich (p. 122)

- Clypeus not or scarcely convex; scutellum not extremely raised, or if so, then with high lateral carinae 3

3. Gastrocoeli distinctly, sometimes deeply impressed, sometimes very large and transverse; postpetiole and usually 1 or 2 of the following tergites strongly sculptured, often medially aciculate or coarsely rugose-punctate. (Arolet usually pentagonal, with intercubiti widely, or at least somewhat separated in front; thyridia distinct, sometimes very conspicuous)

..... A. Ichneumonina Heinrich (p. 57)

- Gastrocoeli only slightly impressed, inconspicuous, sometimes superficial or absent; sculpture of anterior tergites finer than in the Ichneumonina, usually punctured, often coriaceous or finely rugose, rarely the median field of postpetiole finely longitudinally striate. (Arolet usually pentagonal, but with intercubiti tending to be narrowed, often even coalescent in front; thyridia usually distinct, but tending to become inconspicuous or even obsolete, often removed from base of 2nd tergite)

D. Cratichneumonina Heinrich (p. 124)

II. A. Subtribe Ichneumonina Heinrich

Ichneumonina Heinrich, 1967-1968:487-489.

Type genus: *Ichneumon* Linnaeus.

SYSTEMATICS: The decisive characters of this subtribe are the fairly large and distinctly impressed gastrocoeli with distinct thyridia, in combination with oxygygous abdomen of females and with comparatively coarse, usually aciculate or longitudinally rugose (exceptionally punctate) sculpture of postpetiole and/or anterior tergites. Areolet usually pentagonal, but narrowed in front; structure of head and mandibles normal; clypeus not convex.

Key to genera of Ichneumonina recorded from Florida and neighboring land areas

1. Propodeum with strong apophyses as in *Hoplismenus* Gravenhorst. (The only known species ferruginous with restrict-

- ed yellow and almost without black markings) 6. *Hemihoplis* Heinrich
- Propodeum without strong apophyses 2
2. Mandibles short and wide, with subequal teeth, separated by a deep and wide gap; areolet with intercubiti unusually widely separated in front; anterior tergites strongly sclerotized and coarsely punctured, separated by deep sutures. (The only species occurring in Florida ferruginous, dark winged) 8. *Trogomorpha* Ashmead
- Mandibles and areolet normal; anterior tergites less coarsely sculptured 3
3. Clypeus with very coarse and rather dense punctures, usually confluent and forming irregular, longitudinal, short rugae toward its apical border; in females, clypeus apically in the middle slightly protruding and a trifle raised. (The only American species is medium sized, black, with dark wings; females with apical white mark .. 4. *Chasmias* Ashmead
- Clypeus with normal sculpture, apico-medially neither protruding nor raised 4
4. Median field of postpetiole aciculate. 5
- Median field of postpetiole punctate or nearly smooth, sometimes with irregular rugosity see *Cratichneumonina* Heinrich (*Melanichneumon* group)
5. Clypeus apically not truncate, but forming a flat bow percurrent from side to side. (Area superomedia unusually large, arched in front, in females approximately horseshoe shaped, in males abbreviated, much wider than long, often sickle shaped; the only American species black, with rich white marks) 5. *Orgichneumon* Heinrich
- Clypeus with truncate, straight apical border 6
6. Scutellum laterally carinate for entire length and distinctly raised above postscutellum; area superomedia distinctly narrowed toward area basalis, arched in front; costulae distinct. (The only North American species has apical white bands on all tergites and rich white markings on head and thorax) 7. *Menkokia* Heinrich
- Scutellum laterally never carinate and,

as a rule, not raised above postscutellum; area superomedia not arched in front, usually approximately parallel sided, in females often longer than wide and nearly rectangular, in males usually about square or somewhat wider than long; costulae usually indistinct, often obsolete. (Basic color of females often ferruginous, sometimes black, often with apical white marks on last tergites, rarely with white apical bands on a few tergites; males of many species strongly sexually dimorphic, with black- and yellow-banded abdomen) 3. *Ichneumon* Linnaeus

3. Genus *Ichneumon* Linnaeus

Ichneumon Linnaeus, 1758:343, 560. Heinrich, 1961:211-214. Heinrich, 1965a:79-81 (9 new species from Burma). Heinrich, 1967-1968:490-492 (treatment of genus and 4 species from Africa, Madagascar, and the Seychelles).

Type species: *Ichneumon extensorius* Linnaeus; designated by Int. Comm. Zool. Nomencl., opin. 159, 1945.

Brachypterus Gravenhorst, 1829:673 (name preoccupied).

Type species: *Brachypterus means* Gravenhorst.

Pterocormus Foerster, 1850:71. Townes, et al., 1961:382 (genera *Colobacis* Cameron, 1900, *Tyanites* Cameron, 1903, *Vabsaris* Cameron, 1903, *Matsumurais* Ashmead, 1906, and *Coreojoppa* Uchida, 1926 as synonyms; 14 species listed). Townes, et al., 1965:459 (genera *Bureschias* Heinrich and *Thyrateles* Perkins as further synonyms; 142 species listed). Townes and Townes, 1966:263 (12 species listed).

Colobacis Cameron, 1900:110.

Type species: (*Colobacis forticornis* Cameron) = *lotatorius* Fabricius. Monobasic.

Tyanites Cameron, 1903b:95.

Type species: *Tyanites rufipes* Cameron; monobasic.

Vabsaris Cameron, 1903b:96.

Type species: (*Vabsaris forticornis* Cameron), monobasic = *Tyanites rufipes* Cameron (according to Townes, et al., 1961:382).

Euichneumon Berthoumieu, 1904:33.

Type species: *Ichneumon sarcitorius* Linnaeus, designated by Townes, 1944.

Matsumuraius Ashmead, 1906:169.

Type species: *Matsumuraius grandis* Ashmead, monobasic.

Coreojoppa Uchida, 1926:63.

Type species: *Coreojoppa flavomaculata* Uchida, original designation.

SYSTEMATICS: The genus *Ichneumon* is a comparatively well defined unit in spite of its great number of species. I disagree with the synonymization of the 2 genera, *Bureschias* and *Thyrateles* with *Ichneumon* (Townes, et al., 1965). The case of *Thyrateles* is somewhat arbitrary inasmuch as the males of this genus cannot be distinguished morphologically from *Ichneumon*. However, the genus *Thyrateles* is biologically well characterized by its specialization on Nymphalidae as hosts, and the females are also distinguishable in structure. The case of *Bureschias* is altogether different; I have reexamined the type species recently, and I am convinced more than ever that *Bureschias* is not even closely related to *Ichneumon*. Its morphology would indicate a relationship to *Spilichneumon* Thomson rather than to *Ichneumon*, but the structural differences from *Spilichneumon* are rather striking, too, and obviously of generic nature. As to *Colobacis* as a synonym of *Ichneumon* I cannot comment here as I have not yet had the opportunity to examine the type species.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females stout and filiform to slender, long and bristle shaped; of males with a row of bacilliform to oval tyloids and with moderately distinct subapical bristle ridges on ventral side.

HEAD: Temples and cheeks usually neither considerably swollen nor very strongly narrowed; clypeus always normal, flat, with straight apical border; mandibles in majority of species, including the type species, normal, with distinct subapical tooth; in another group of species, represented by the Nearctic species *creperus* Cresson, *ambulatorius* Fabricius, and *weemsi* Heinrich from Florida, the subapical tooth is rudimentary.

THORAX: Mesoscutum about as long as medially wide, or slightly longer, rather flat; notauli usually subobsolete or distinct at the base only; scutellum flat to moderately convex, not laterally carinate; horizontal part of propodeum in females usually nearly as long as declivity, in males always relatively shorter than in females; area superomedia separated from area basalis, usually parallel sided, sometimes slightly narrowed from base to apex, usually quad-

angular, either square or rectangular, often longer than wide; costulae obsolete or subobsolete in majority of species, less so in males than in females; sculpture of entire thorax usually rather coarse, strongly punctured.

LEGS: Moderately stout; coxae III of females often with scopa that is usually not very distinct or dense.

WINGS: Nervulus postfurcal and oblique; areolet clearly pentagonal; radius usually nearly straight; usually clear, sometimes moderately to strongly infuscated; infuscation of wings not always shared by males.

ABDOMEN: Of females oxypygous, ovipositor usually slightly projecting; postpetiole with more or less clearly defined median field, which is more or less clearly longitudinally striate, never punctured; gastrocoeli of medium size, more or less deeply impressed, always with distinct thyridia; hypopygium of males neither sharply pointed nor projecting, but forming an obtuse angle apically.

CHROMATIC CHARACTERS: White marks on apical tergites of females are common, sometimes combined with white apical bands or margins on anterior tergites; often abdomen uniformly red (or ferruginous), black, or both colors in combination. Sexual dichromatism sometimes only slight, more often very pronounced; in the latter case abdomen of males is usually black and yellow banded.

DISTRIBUTION: World-wide. A genus with enormous speciation in the Holarctic Region. Represented in the arctic regions as in Greenland, Baffin Island, and the Aleutian Islands as well, as on the highest elevations of the subtropical and tropical belt (as in the Himalayas and Latimodjong Mts. in Celebes). Very few species have adapted to the life in regions without real winter. Until now only 2 species are recorded from Florida, an amazingly small number as compared to the nearly 100 species listed from northeastern North America (Heinrich, 1961).

Throughout the lowlands of the neighboring southeastern States, the recorded number of *Ichneumon* species is correspondingly low; however, in the most northern, mountainous areas of Georgia, it increases suddenly and markedly (species found in hibernation by R. Duffield, among others). No doubt, many further species still can be found there. Most, if not all of these species, actually do not belong to the ecosystem of the southeastern lowlands (the "Austroriparian Zone"), but

are part of the northeastern fauna (the "Alleghanian Zone"; see map, Townes and Townes, 1951). Being adapted to hibernation and consequently depending upon seasonal changes to low temperatures close to the freezing point and below, they were able to follow the Appalachian chains southward to their most southern spurs into Georgia (and most likely also into the mountains of northernmost Alabama), but not further into the lowlands.

HOSTS: A broad spectrum of Heterocera, mainly Noctuidae and Arctiidae. Also Pyralidoidea, Tortricoidea, Sesiidae, Hepialidae, and the genus *Ctenucha* (Ctenuchidae).

ECOLOGY: Many species are forest dwellers, but probably even more inhabit open and semi-open habitats such as overgrown fields, meadows, alpine meadows, and tundras. The genus is, with few exceptions, confined to climates with a marked seasonal change of warm and cold weather, in other words to regions with summer and winter. Fertilized females hibernate in a variety of quarters which offer a certain degree of protection against extremely low temperatures and at the same time against desiccation. They also are adapted biochemically to survive very low temperatures in a state of torpidity.

**Key to the species of *Ichneumon*
Linnaeus of Florida
and the neighboring states
FEMALES**

1. All tibiae and at least tarsi I and II extensively white banded. (Large species, 19-20 mm long; wings moderately infuscated; flagellum short, subfiliform; abdomen light red, except 1st segment.) 12. *devinctor* Say
- Tibiae and tarsi not white banded. (In 1 species, *heterocampae* Cushman, however, the tibiae medially yellowish.) 2
2. Abdomen uniformly black. (Scutellum extensively white; coxae III without scopa. Length 10-13 mm) 5. *mendax* Cresson
- Abdomen red, or black and red (ferruginous) in combination, sometimes with white markings. 3
3. Wings deeply infuscated, large species, 14-19 mm long. (Flagellum bristle shaped; coxae III without scopa.) 4
- Wings, at the most, slightly infuscated; smaller species, 5-14 mm long 5

4. Legs (except tibiae I ventrally), mesoscutum, and the basic color of head, black. Tergites 2-7 uniformly dark red. Length 16-17 mm 8. *grandisops* Heinrich
- Legs, mesoscutum, and head pale ferruginous. Tergites 2-7 also ferruginous, the 3rd tergite with extensive, sometimes also the 2nd tergite with a narrow, basal black band. Length 14-19 mm 4. *lewisii* Cresson
5. Mandibles tapering into 1 long apical tooth, the subapical tooth indicated by a notch only. (Coxae III with more or less distinct scopa. 7th tergite without dorsal, apical white (or yellowish) mark, but sometimes with a transverse, apical white band.) 6
- Mandibles with distinct, subapical tooth. (Coxae III without distinct scopa. 7th tergite sometimes with dorsal, apical mark) 7
6. At least the 6th tergite, usually also the 3rd and 4th, exceptionally even the 7th, with apical white bands. Basic color of mesoscutum and of the apical tergites black, scutellum white. (Length 10-13 mm) 6. *ambulatorius* Fabricius
- Abdomen without white bands. Mesoscutum, scutellum, and apical tergites ferruginous. (Length 11-14 mm) 1. *weemsi* Heinrich
7. Mesosternum and most of mesopleura ivory. Tergites 2 and 3 with large, irregular, latero-apical ivory marks. Mesoscutum densely sculptured and opaque. (Tergites 6 and 7 with dorso-apical ivory marks. Length 14 mm).... 3b. *fuscifrons torreyae*, new subspecies
- Mesosternum and mesopleura black. Tergites 2 and 3 without ivory marks. Mesoscutum not opaque 8
8. Very small species, 5-6 mm long. Flagellum with, at the most, 24 segments, usually with 23. (Mesoscutum, scutellum, and abdomen ferruginous) 9. *pumiliops* Heinrich
- Markedly larger species, 9-13 mm long. Flagellum with 30-38 segments. (Abdomen red, except petiole or entire 1st tergite; scutellum white or yellow.) .. 9
9. Gastrocoeli large and very wide, their interspace much narrower than 1 of them. Flagellum bristle shaped, strongly attenuated toward apex. Coxae III with weak scopa. (Mesoscutum entirely or at

least predominantly ferruginous red, abdomen except petiole so colored also. Length 10-12 mm) *7. versabilis* Cresson

- Gastrocoeli less wide, their interspace, at the most, subequal to the width of 1 gastrocoelus. Flagellum subfiliform, only slightly attenuated toward apex. Coxae III without a trace of scopa ..10
- 10. Mesoscutum predominantly to entirely ferruginous red. Coxae III ventrally beyond base smooth and glossy, with a few, scattered punctures. All tibiae dorsally beyond base with yellowish section. (7th tergite never yellow marked. Length 12-13 mm) *11. heterocampae* Cushman
- Mesoscutum predominantly or entirely black. Coxae III ventrally very densely punctured, subopaque. Tibiae III dorsally red or blackish, without yellowish section. (7th tergite sometimes yellow marked. Length 9-13 mm)11
- 11. Temple profile strongly narrowed behind eyes, very slightly curved. First segment of flagellum almost 3 times as long as apically wide, the 12th or 13th approximately square. (Clypeus usually black. Length 9-13 mm) *10. anonymus* Heinrich
- Temple profile less narrowed behind eyes, slightly curved. First segment of flagellum barely 2 times as long as apically wide, the 8th approximately square. (Clypeus usually red. Length 10-12 mm) *2. tritus* Heinrich

MALES

(Males of the species *heterocampae* Cushman, *anonymus* Heinrich, and *pumiliops* Heinrich are unknown.)

- 1. Wings strongly infuscated. Large species, 17-18 mm long 2
- Wings not, or only slightly infuscated. Smaller species, 6-14 mm long. 4
- 2. All femora, tibiae, and tarsi almost entirely black. (Abdomen dark red, except black 1st segment. Thorax black, including scutellum) *8. grandisops* Heinrich
- At least tibiae and tarsi I and II extensively white on dorsal side, sometimes all tibiae and tarsi predominantly or entirely orange or orange and yellow dorsally 3
- 3. At least tibiae and tarsi I and II extensively white dorsally, usually all

tibiae and tarsi extensively white on dorsal side; all femora predominantly black. Abdomen light red, except black 1st segment.....

-12. *devinctus* Say
- All tibiae and tarsi predominantly yellow on dorsal side. All femora pale ferruginous. Abdomen black, with ferruginous bands of varying extent; at least tergites 6 and 7 entirely ferruginous; postpetiole sometimes with apical ivory marks or band..... 4. *lewisii* Cresson
- 4. Abdomen uniformly black. (Scutellum extensively white; mesoscutum often with 2 short median white bands; legs extensively white marked; length 11-13 mm) *5. mendax* Cresson
- Abdomen black, with extensive ivory or yellow bands or lateral marks on some to all tergites 5
- 5. Flagellum with complete white annulus; mesosternum uniformly ivory. (Mesopleura predominantly ivory; tergites 2-4 with latero-apical ivory marks, sometimes confluent on 2nd tergite, postpetiole with apical ivory band; length 14 mm) *3b. fuscifrons torreyae*, new subspecies
- Flagellum without white annulus; mesosternum black 6
- 6. Gastrocoeli large, transverse, their interspace much narrower than 1 of them; postpetiole often restrictedly ivory marked, tergites 2 and 3 always more or less extensively ivory; tergites 4-7 uniformly black. (Length 12-14 mm)... *7. versabilis* Cresson
- Gastrocoeli of smaller size, their interspace distinctly wider than 1 of them; at least tergites 1-4 with apical ivory or yellow bands; tergites 4-7 never uniformly black 7
- 7. Outer orbits and cheeks uniformly black; abdomen black with apical white bands on all tergites, except, as a rule, the 5th; femora III yellow or pale orange with black apex. (Pleura and mesosternum always uniformly black; apical white bands on tergites tending to be narrowed in the middle; length 14-17 mm) *6. ambulatorius* Fabricius
- Outer orbits and cheeks extensively yellow or ivory; abdomen black with apical yellow bands on tergites 1-4 only,

or black with ferruginous last tergite and yellow bands on tergites 1-5; femora III more extensively to predominantly black. (Pleura sometimes yellow marked; propodeum extensively to predominantly yellow) 8

8. Tergites 1-4 yellow with basal black bands, 5-7 uniformly black; lower 1/2 of mesopleura yellow marked to predominantly yellow, usually also mesosternum with some yellow markings; mesoscutum as a rule with 2 short median yellow bands or marks. (Length 13-14 mm) 2. *tritatus* Heinrich

- Tergites 1-5 black with apical yellow bands, the 6th apically, the 7th entirely ferruginous brown; mesopleura, mesosternum, and mesoscutum uniformly black. (Length 13-15 mm) 1. *weemsi* Heinrich

1. *Ichneumon weemsi* Heinrich Map 23

Ichneumon weemsi Heinrich, 1972:175-176, female, male.

Holotype: female, St. Johns Co., Florida; FSCA. Allotype: male, Dade Co., Florida; FSCA.

SYSTEMATICS: Females of this species are closely related, in structure of mandibles and otherwise, to *creperus*; they differ from *creperus* as follows: coxae III with distinct scopa; basal segments of flagellum distinctly less abbreviated; tergites more densely punctured, the 3rd completely opaque; femora III less stout; wings distinctly, though not strongly infuscated.

Males also show structural and chromatic similarity to *creperus*, particularly in color, by the entirely pale yellow apical part of propodeum. They differ in structure by the more rounded (behind eyes) and somewhat less narrowed temple profile, and more densely punctured mesoscutum with obsolete notauli; they differ chromatically from *creperus* as follows: flagellum with ferruginous basal segments and most of its ventral side; outer orbits with cheeks and malar space not entirely black but predominantly yellow; apical segments of tarsi III infuscated; basic color of abdomen not orange-tinged ferruginous but black, with apical yellow bands of tergites 1-5 (often on the 5th ferruginous tinged), the 6th tergite apically and the 7th entirely ferruginous.

FEMALE: Length 11-14 mm. Ferruginous; the following black: prosternum, sometimes

also mesosternum, base of propodeum (particularly laterally), all coxae and trochanters ventrally extensively to entirely, broad basal bands on tergites 3 and 4, usually petiole, apex of tibiae III broadly, and the tarsi III predominantly; scutellum faintly yellow tinged; wings somewhat infuscated; flagellum tricolored, coxae III with distinct scopa. Segments 7 or 8 to 12 or 14 dorsally whitish, section beyond annulus black, section before annulus, ventral side of annulus, and scape pale ferruginous.

FLAGELLUM: Subbristle shaped, distinctly, though not strongly attenuated toward apex, barely widened beyond middle, with 35-38 segments, the 1st fully 1.5 times as long as apically wide, in lateral view the 7th square, the widest, seen on the flat side, nearly 1.5 times as wide as long.

HEAD: Transverse, temple profile and cheek profile slightly narrowed behind eyes and toward mandible base respectively, the former with slightly curved, the latter with practically straight outline; malar space somewhat shorter than width of mandible base; mandibles as in *creperus*, with long and strong apical and rudimentary, removed from tip, subapical tooth; frons very densely and coarsely punctured, face also densely rugose punctate, clypeus and cheeks with sparse punctures.

THORAX: Mesoscutum coarsely and very densely punctured; notauli obsolete; scutellum flat, less densely punctured, shiny; area posteromedia slightly longer than horizontal part medially; carination of propodeum complete, including costulae; area superomedia longer than wide, approximately rectangular; mesopleura, including speculum, coarsely and densely rugose punctate; metapleura densely and more coarsely reticulate rugose. Ferruginous, collar, scutellum, and subalarum faintly yellow tinged; the following black: basal furrow of horizontal part of propodeum, including area basalis, basal part of sides of propodeum more extensively (including areae coxales, carinal triangle, and space before spiracles), prosternum, middle of prepectus and of mesosternum, sometimes entire mesosternum.

LEGS: moderately stout; coxae III coarsely and densely punctured, with distinct scopa.

WINGS: Nervulus oblique, interstitial or a trifle postfurcal; areolet clearly pentagonal; radius very slightly sinuate.

ABDOMEN: Postpetiole with sharply delimited, irregularly longitudinally striate

median field and coarsely punctured lateral fields; gastrocoeli normal, moderately impressed, with distinct thyridia; 2nd and 3rd tergites moderately coarsely but very densely punctured, the 2nd slightly less densely than the 3rd, slightly shiny, the 3rd opaque, both extremely finely coriaceous between punctures; 4th tergite extremely finely punctured and coriaceous, also opaque.

MALE: Length 13-15 mm. Head black, with frontal orbits narrowly, outer orbits broadly, mandibles except teeth, and face and clypeus entirely yellow; malar space ferruginous-tinged yellow, thorax black, including entire mesosternum, mesopleura, and mesoscutum (the latter sometimes with short, lateral, yellow stripes at tegulae); propodeum with entire declivity yellow, including most of area superomedia and of areae dentiparae and parts of areae spiraculiferae; yellow also are collare, pronotal ridge and base, subalarum, tegulae, apex of prosternum, and scutella; legs I and II almost entirely yellow and light ferruginous, with only coxae basally restrictedly black; legs III with most of coxae and femora and broad apices of tibiae black, their tarsi infuscated toward apex; femora I and II orange, ventrally yellow, femora III black, narrowly orange at base; all tibiae and tarsi yellow, apical 1/3 of tibiae III black, as are also apices of segments 1 and 2 of tarsi III and segments 3-5 of tarsi III almost entirely; abdomen black, with apical yellow bands on tergites 1-5, the 6th tergite apically and the 7th entirely ferruginous; flagellum black, the basal 3 segments entirely, the following segments ventrally ferruginous, the latter color gradually shading into black toward apices of flagella; scape ferruginous, ventrally yellow.

FLAGELLUM: All apices lacking; with bacilliform tyloids on segments 5 or 6 to 14 or 15, the longest not reaching to bases and apices of segments.

HEAD: Temple profile barely narrowed behind eyes, distinctly curved; malar space about 1/2 as long as width of mandible base; mandibles similar to female, but subapical tooth somewhat more developed.

THORAX: Mesoscutum coarsely and very densely punctured; scutellum slightly convex, less densely and coarsely punctured than the mesoscutum; propodeum more abbreviated than in female, the area superomedia approximately square, or slightly wider than long.

DISTRIBUTION (map 23): Known only from Florida. Alachua Co.: Gainesville, 1



Map 23. *Ichneumon weemsi* Heinrich

female, 13-XI-1961, 1 male, 24-IV-1958, F. W. Mead (CHT). Dade Co.: 1 male, Everglades National Park, 10-IV-1955, F. W. Mead (FSCA). Hardee Co.: 1 female, Wauchula, 8-III-1965, R. H. Rhodes, in Steiner trap (CGH II). St. Johns Co.: 1 female, South Bay, 3 females, 3 males, 14-IV-1961, ex *Leucania latiuscula* H.-S., Gifford (USNM).

HOST: *Leucania latiuscula* (H.-S.).

2. *Ichneumon tritus* Heinrich

Map 24

Ichneumon tritus Heinrich, 1961:256-257, female. Heinrich, 1969:942, female (variability)

Holotype: female, Quebec, Mt. Oxford; CNC (No. 7090). Neallotype: male, Maine, North Berwick; CGH II. (present designation).

SYSTEMATICS: The female is rather similar to *anonymus* Heinrich and *vivax* Cresson; easily distinguished from *anonymus* by shorter basal segments of flagellum and by distinctly less narrowed temple profile; more difficult to distinguish from *vivax* by: (1) slightly shorter first flagellar segment; (2) apically less slender and less attenuated flagellum; (3) basally fairly distinct notauli; (4) only the 7th tergite marked with white. The color of mesoscutum of the female varies (Heinrich 1969) from entirely black to black with lateral lobes extensively ferruginous; the Tennessee specimen belongs to the former variety.

A series of 6 males, all collected in Tennessee at the same locality and time, together with 1 female of *tritus* represent in all probability the associated sex of the latter, a hypothesis also supported by the fact that during 1 month of intensive collecting (by hand and 6 Malaise traps) no other, even remotely similar, species of the genus *Ichneumon* was found in this area. The following description of the male of *tritus* is based on the series from Tennessee; these males are distinguished by extremely rich yellow markings of the entire body; particularly characteristic is the yellow pattern on the mesoscutum, propodeum, and mesopleura (the latter in contrast to the always predominantly or entirely black mesosternum), and the nearly entirely yellow coxae and trochanters. Broad series of males from Maine and New York in CGH II show quite analogous yellow pattern, but under general reduction of the extent of the various yellow markings, particularly on coxae III (See note at end of treatment.).

FEMALE: Length 10-12 mm. Head black, with ferruginous clypeus and interior orbits, often with a whitish spot at level with antennal sockets; mesoscutum black, often with ferruginous lateral lobes; pleura, sterna, and propodeum black, the latter sometimes partially ferruginous; scutellum and subalarum, usually also postscutellum, white; abdomen red, except black petiole and small apical yellowish mark on 7th tergite; rarely black basal band on 3rd tergite; legs black, tibiae and tarsi ferruginous, except apex of tibiae III; 2nd trochanters III and extreme base of femora III also ferruginous; flagellum black, with complete white annulus on segments 6 or 7 to 12 or 13.

FLAGELLUM: Subfiliform, moderately slender, slightly attenuated toward apex, ventrally flattened and a trifle widened beyond middle, with 32-34 segments, the 1st nearly 2 times as long as apically wide, the 8th square, the widest about 1.3 times as wide as long.

HEAD: Temple profile moderately narrowed behind eyes, with slightly curved outline; cheek profile moderately narrowed toward mandible base, with almost straight outline; malar space slightly shorter than width of mandible base. In addition to clypeus, frontal and vertical orbits, sometimes also facial orbits and mark on middle of outer orbits ferruginous, rarely also middle of face.

THORAX: Mesoscutum moderately convex; fairly densely punctured and extremely

finely coriaceous between punctures, shiny; notauli basally distinct; area superomedia square. Apex of pronotal ridge, tegulae, and usually collare ferruginous.

LEGS: Coxae III ventrally fairly finely and very densely punctured, particularly on inner side, subopaque, without scopa; femora III rather stout, finely coriaceous and densely and finely punctured on dorsal side.

ABDOMEN: Gastrocoeli roughly quadrangular, each considerably narrower than its interspace, the latter longitudinally striate; tergites 2 and 3 with finely coriaceous undersculpture and very densely punctured, close to subopaque.

MALE: Length 13-14 mm. Black, with very extensive lemon-yellow markings; the following yellow: mandibles (except teeth), face and clypeus entirely, inner orbits broadly up onto vertex, outer orbits from below temple region down to mandible base, gradually widening over entire width of cheeks and including malar space (the latter rarely with black spot), collare, pronotal ridge and pronotal base broadly, subalarum, tegulae, a bipartite median mark on mesoscutum, usually also short and narrow lateral bands on mesoscutum near tegulae, often marks on prescutellar carinae, scutellum, postscutellum, usually apex of prosternum more or less extensively, a large mark or band on lower 1/2 of mesopleura, often a line along sternauli and 2 apico-median marks on the always predominantly black mesosternum, propodeum except black metapleura and usually partially or entirely black area basalis, areae superomedia and posteromedia (sometimes entire propodeum yellow except only metapleura), postpetiole, tergites 2-4 except black basal bands, and often also some irregular band on apical margin of 5th tergite; legs yellow, except the following black parts: posterior side of femora I and II more or less extensively, femora III, except usually orange extreme base and a longitudinal, narrow ivory line or apical mark on ventral side, sometimes also a yellow, longitudinal band on dorsal side, base and both sides of coxae III more or less extensively, sometimes coxae III almost entirely, broad apex of tibiae III, and at least the apical segment of tarsi II and III; flagellum black, without annulus, ventrally pale brownish, scape ventrally yellow.

FLAGELLUM: With 35-36 segments and with elongate, bacilliform tyloids on segments 6-15, the longest on segments 9-12, reaching close to bases and apices of segments.

HEAD: Malar space extremely short, about 1/4 as long as width of mandible base.

THORAX: Mesoscutum densely punctured and coriaceous on anterior part, more sparsely punctured and shiny between punctures towards middle and beyond; anterior 1/3 of notauli distinct; scutellum slightly raised above postscutellum, slightly convex, sparsely and finely punctured, shiny; carination of propodeum complete, area superomedia approximately square, usually slightly narrowed toward apex.

Note: In northeastern populations of males the yellow mark on mesopleura and the bipartite mark on mesoscutum usually are more or less strongly reduced, but very rarely entirely lacking; more strongly reduced are the yellow markings on coxae III and femora III, which often are lacking entirely, as are often also the lateral yellow lines on mesoscutum; the coloration of head, legs I and II, propodeum, and abdomen agrees generally with the southeastern males.

DISTRIBUTION (map 24): Quebec, Ontario, New York, Maine, Tennessee. TENNESSEE. Henderson Co.: 1 female, 6 males, Natchez Trail State Park, 1-13-VII-1972, G. Heinrich, D. Shanek (CGH II).



Map 24. *Ichneumon tritus* Heinrich

3a. *Ichneumon fuscifrons fuscifrons* Cresson

Pterocormus fuscifrons, Townes and Townes, 1951:298, female.

Holotype: female, Illinois. ANS. Neallotype: male, Maine. CGH II.

SYSTEMATICS: In structure and color a somewhat aberrant species of the genus. Distinguished in both sexes by the extremely densely punctured and finely coriaceous opaque mesoscutum, rather strongly raised scutellum, and by the head structure of female, with long, strongly narrowed toward mandibles, cheek profile and, in both sexes, concave frons.

Males display in northern populations the yellow-banded color pattern of the abdomen characteristic for many species of this genus, but, in this chromatic group are uniquely distinguished by a white annulus on flagellum and also by the unusually long malar space.

The wide range of this species is divided between 2 subspecies, strikingly different in color but congruent in sculpture and structure.

FEMALE: Length 13-14 mm. Head black, cheeks, face, and clypeus varying between black and ferruginous, frontal and vertical orbits ferruginous or ivory; mesoscutum usually black, the median lobe sometimes dark ferruginous, or with 2 short, median, obscure-ferruginous stripes, exceptionally replaced by yellow ones; subalarum and scutella always white; collar reddish or white, pronotal ridge entirely or apically ferruginous, sometimes apically white; tegulae ferruginous, sometimes blackish; propodeum black, the lateral areae of the horizontal part sometimes ferruginous, rarely also metapleura in part; areae dentiparae sometimes with small, apical white spot; mesopleura rarely obscure reddish medially, exceptionally with an ivory mark; sterna uniformly black; abdomen rufous, with apical ivory marks usually on 6th and 7th tergite, rarely on the 7th only, and usually with ivory latero-apical marks on postpetiole, sometimes also on 2nd and 3rd tergite; petiole black; legs predominantly rufous, basic color of coxae varying from rufous to black, coxae II always extensively ivory marked, coxae III usually with dorsal ivory patch, coxae I sometimes apically restrictedly ivory; tibiae III and femora III usually apically more or less extensively black, the femora III sometimes predominantly black; flagellum with segments 1-6 or to 7 usually entirely or predominantly ferruginous sometimes dorsally black, rarely

entirely black, segments 7 or 8 to 12, 13 or 14 with complete white annulus, black or brown beyond annulus; scape ferruginous, dorsally black.

FLAGELLUM: Bristle shaped, long and slender, ventrally flattened but barely widened beyond middle, extremely attenuated toward apex, with 37-39 segments, the 1st fully 4 times as long as apically wide, the 13th approximately square.

HEAD: Temple profile strongly narrowed behind eyes, with straight outline; occipital region steeply and immediately declivous from ocelli and eyes; cheek profile long, strongly narrowed toward mandible base, with straight outline; malar space markedly longer than width of mandible base; cheeks in lateral view fairly narrow and barely convex; frons concave; mandibles slender, the upper tooth long and sharply pointed.

THORAX: Mesoscutum distinctly longer than wide, very densely punctured and coriaceous, opaque; notauli basally indicated; scutellum distinctly raised above postscutellum, dorsally convex, shiny; carination of propodeum distinct and complete, area superomedia usually slightly wider than long and slightly narrowed in front; areae dentiparae distinctly slanting downward.

LEGS: Long and slender; coxae III densely punctured, without scopa.

ABDOMEN: Fairly slender, strongly oxygygous, ovipositor somewhat projecting; gastrotrocoeli moderately deepened, quadrangular, each distinctly narrower than interspace; postpetiole with distinct, aciculate median field; tergites 2 and 3 rather densely punctured.

MALE: Length 12-15 mm. Black, with extensive ivory markings; the following ivory: mandibles except teeth, clypeus, face, frontal and vertical orbits, outer orbits broadly below temple region (except black apex of cheeks and malar space), scutellum, postscutellum, 2 short median lines on mesoscutum, rarely 2 short lateral lines on mesoscutum, prescutellar carinae, collare, pronotal ridge and base, usually 1 or 2 marks on mesopleura, often mark on metapleura, areae superoexternae, dentiparae, posteroexternae, and spiraculiferae, postpetiole, tergites 2 and 3 (except black basal bands), often lateral marks on 4th tergite, all trochanters (except bases of trochanters III), coxae I and II entirely or except bases, usually dorsal patch on coxae III, all tibiae and tarsi (except broadly black apex of tibiae III), posterior side of femora I and II; femora

III rufous, shading gradually into black toward apex, or predominantly black, narrowly rufous and yellow basally; flagellum with complete white annulus on segments 12, 13 or 14 to 18 or 19; dorsally black, ventrally pale brown; scape ventrally ivory.

FLAGELLUM: With bacilliform, very narrow tyloids on segments 8 or 9 to 14 or 15; 1st segment long, about 4 times as long as apically wide.

HEAD: Malar space about 1/2 as long as width of mandible base; temple profile less strongly narrowed than in female and not quite straight.

DISTRIBUTION: Maine, Quebec, Ontario west to Illinois and Iowa, and south to Arkansas. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 13-V-1972, D. Shaneck (CGH II).

**3b. *Ichneumon fuscifrons torreyae*,
new subspecies
Map 25**

FEMALE: Length 14 mm. Head white, with black antennal cavity, black middle of frons, ocellar and occipital regions; thorax black, pleura and propodeum predominantly white, the following white: collare, pronotal ridge and base broadly, subalarum, tegulae, 2 long, convergent and apically confluent, longitudinal median bands and 2 short lateral lines on mesoscutum, scutellum, postscutellum, mesopleura almost entirely (except restricted black marks on area of speculum and below subalarum), propodeum (except black area basalis, superomedia, posteromedia, coxalis, and base of metapleura), about apical 1/3 of prosternum, a band along sternauli, sometimes longitudinal median band on mesosternum, and margin of prepectus more or less extensively; abdomen pale orange, petiole black, the following pale yellow: very large, not clearly defined, apico-lateral marks on tergites 1-3 and dorsal marks on tergites 6 and 7; all coxae and trochanters white, except predominantly ferruginous or blackish ventral and interior side of coxae III, all tarsi pale yellowish, all tibiae and tarsi ferruginous orange; flagellum black, with complete white annulus on segments 6 (apex) to 14; scape ventrally white.

MALE: Length 13-15 mm. Head and thorax almost as in female, except mesosternum completely white, prosternum and prepectus predominantly so; basic color of abdomen, in contrast to female, black as in the nominate form, but, in contrast to the latter, the apical ivory bands on the 2nd and 3rd tergites

medially interrupted; 4th tergite with small ivory latero-apical marks; legs similar to nominate form, except basal 1/2 of femora III yellowish or pale orange and coxae III predominantly ivory (allotype) or black only on ventral side (paratype).

FLAGELLUM: With tyloids on segments 7 or 8 to 15 or 16 and with complete white annulus on segments 11-20; black, ventrally brownish (allotype) or black all around (specimen from Tennessee); scape ventrally white.

Holotype: Female: Georgia, Monroe Co. Forsyth, 20-V-5-VI-1971, F. Naumann.

Allotype: Male: Florida, Liberty Co., Torreya State Park, 11-V-1968, G. Heinrich.

Paratypes: 1 female, Georgia, Clark Co., Athens, 26-28-V-1969, G. Heinrich.

1 male, Tennessee, Henderson Co., Natchez Trail State Park, 5-10-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

DISTRIBUTION (map 25): Known only from the type specimens as outlined above.

4. *Ichneumon lewisii* Cresson Map 26

Ichneumon lewisii Cresson, 1864:177, female. Heinrich, 1959b:207, female. Heinrich, 1961:300-302, female, male.

?*Ichneumon fulvopictus* Ashmead, 1890:391, male.

Pseudamblyteles lewisii, Townes and Townes, 1951:293, female, male.



Map 25. *Ichneumon fuscifrons torreyae* n. subsp.

Holotypes: *Ichneumon lewisii*, female, Illinois; ANS. *Ichneumon fulvopictus*, male, Montana; USNM.

SYSTEMATICS: Another aberrant species of the genus, distinguished by dense, opaque sculpture of mesoscutum and tergites 2 and 3 in both sexes, and in males by a row of broadly oval tyloids extending over 16 segments. A large species with strongly infuscated wings and with black and ferruginous basic colors of great individual variability in the ratio of their combination.

The correctness of the synonymy of *fulvopictus* seems questionable (Heinrich, 1961). Consequently the occurrence of the species as far west as Montana still needs confirmation.

FEMALE: Length 14-19 mm. Basic color of entire body, including legs, ferruginous; the following black: propodeum, pleura, and usually sterna entirely to predominantly, 3rd tergite basally extensively, sometimes base of 2nd tergite partially, usually also the 1st tergite; wings strongly and evenly infuscated; flagellum ferruginous, black apically, ivory medially.

FLAGELLUM: Slender, bristle shaped, not widened beyond middle, extremely attenuated toward apex, with 45-47 segments, the 1st more than twice as long as apically wide, the 9th or 10th square.

HEAD: Temple profile and cheek profile strongly narrowed behind eyes and toward mandibles respectively, with almost straight outlines.

THORAX: Mesoscutum coarsely and densely punctured, nearly opaque; only about anterior 1/5 of notauli fairly distinct; scutellum somewhat raised above post-scutellum, dorsally flattened; sculpture of pleura and entire propodeum very coarse, reticulate wrinkled; area supermedia approximately square, sometimes wider than long or narrowed toward apex; carinae coxales lacking.

LEGS: Slender and elongate; coxae III ventrally densely and fairly coarsely punctured, shiny between punctures, without scopa.

ABDOMEN: Postpetiole markedly wider than long, longitudinally striate including lateral fields; gastrocoeli moderately deepened, distinctly wider than long, their interspace about as wide as or somewhat wider than 1 of them; tergites 2 and 3 fairly strongly and very densely punctured, medially rugose punctate, without space between punctures, opaque; hypopygium triangular.

MALE (Louisiana population): Length 17-18 mm. Head ferruginous, always with pale yellow face, clypeus and part of mandibles, more often than not with black middle of frons, ocellar and occipital regions; thorax black, rarely with longitudinal ferruginous lines, the following ivory: scutellum usually entirely or apically (rarely entirely black), often marks on prescutellar carinae, the subalarum, collare, often apex of pronotal ridge (the latter usually narrowly ferruginous), rarely marks on areae dentiparae and posteroexternae; abdomen black and ferruginous with usually apical ivory band or 2 ivory latero-apical marks on postpetiole; tergites 7 or 6 and 7 always ferruginous, the 2nd tergite sometimes predominantly to entirely ferruginous, tergites 3-5 usually predominantly black, apically more or less extensively ferruginous; coxae and trochanters black, coxae II or I and II usually ivory marked, all 2nd trochanters entirely, sometimes also 1st trochanters partially, ivory or pale orange, tibiae and tarsi yellowish, the former gradually shading into orange toward apex, the apex of tibiae III usually blackish at the extreme end; femora III sometimes partially blackish toward apex.

FLAGELLUM: With 45-47 segments and with broadly-oval tyloids on segments 4 or 5 to 20, the longest reaching from bases to apices of segments, without transverse bristle ridges on ventral side. Basal segments predominantly or entirely and ventral side to beyond middle brownish or ferruginous, dorsal side and apex black, scape ferruginous, sometimes ventrally yellowish in part.

NOTE: One male from northern Mississippi differs from all specimens from Louisiana by considerably more extensive melanism: flagellum and femora III predominantly black, abdomen black, except only tergites 6 and 7 ferruginous and the apical margin of the 5th; scutellum, pronotal ridge, and coxae I and II also entirely black. Structure and sculpture leave no doubt that this specimen belongs to *lewisii*.

DISTRIBUTION (map 26): Atlantic to 100° west in Upper Austral Zone (Townes and Townes, 1951), Louisiana, Mississippi. LOUISIANA. 2 males, Bistineau State Park (near Doyline), 29-IV-4-V-1972, G. Heinrich, D. Shaneck. Evangeline Co.: 2 males, 28-VI-5-VIII-1971, G. Heinrich. Natchitoches Co.: 2 males, College Forest, 14-17-VI-1971, G. Heinrich. MISSISSIPPI. Yalobusha Co.: 1 male, Water Valley, M. Horan. GEORGIA.



Map 26. *Ichneumon lewisii* Cresson

Enotah Bald, 28-VI-1935, P. W. Fattig (USNM).

HOST: *Apantesis* sp. (Townes and Townes, 1951).

5. *Ichneumon mendax* Cresson

Map 27

Ichneumon mendax Cresson, 1877, 6:149, female. Heinrich, 1961:334-335, female, male.

Heinrich, 1969:947, female, male (variability).

Phygadeuon guignardi Provancher, 1886:50, female.

Pterocormus mendax, Townes and Townes, 1951:299, female.

Holotypes: *Ichneumon mendax*, female, Canada; ANS. *Phygadeuon guignardi*, female, Canada; PMQ. Neallotype: male, Quebec; CGH II.

FEMALE: Length 10-13 mm. Black, including legs; the following white: upper part of facial orbits, the frontal and vertical orbits broadly, sometimes lateral marks on clypeus, collare, pronotal ridge broadly, subalarum, scutellum except base, apex of femora I, and the tibiae I on anterior side; flagellum with white annulus on segments 7 or 8 to 12.

FLAGELLUM: Filiform, ventrally somewhat flattened beyond middle but barely widened, and barely attenuated apically,

with 28-31 segments, the 1st about 2.3 times as long as wide, the 7th square.

HEAD: Temple profile and cheek profile moderately narrowed, the former with curved, the latter with almost straight outline; malar space distinctly shorter than width of mandible base.

THORAX: Mesoscutum slightly convex, finely, and on the anterior part fairly densely punctured, posterior part shiny, notauli basally distinct; scutellum slightly raised above postscutellum; carination of propodeum strong and complete, including costulae; area superomedia about as long as wide, usually a trifle widened at costulae, sometimes slightly narrowed toward base.

LEGS: Coxae III finely and very densely punctured, without scopa.

ABDOMEN: Median field of postpetiole finely and densely aciculate; gastrocoeli moderately deepened; 2nd tergite finely and fairly densely, the 3rd tergite still finer and less densely punctured.

MALE: Length 11-13 mm. Black; the following white: mandibles except teeth, clypeus, face, frontal and vertical orbits broadly, lower 1/2 of outer orbits broadly (not including apical margin of cheeks and malar space), venter of scape, collare, pronotal ridge and base, subalarum, tegulae, often 2 short median lines on mesoscutum, coxae I and II except basally, 1st trochanters I and II, 1st trochanters III apically, all 2nd trochanters, anterior side of femora I, anterior side of femora II except basally, entire dorsal side of tibiae I, dorsal side of tibiae II except apically, dorsal or full annulus beyond base of tibiae III, more or less extensively bases of all 1st segments of tarsi I and II.

FLAGELLUM: With narrow, elongate-oval tyloids on segments 5-10, the longest reaching nearly from bases to apices of segments.

DISTRIBUTION (map 27): Atlantic to 100° west in Transition and Upper Austral Zones (Townes, 1961). GEORGIA. Monroe Co.: 1 female, Forsyth, 1-9-VIII-1970, F. Naumann. LOUISIANA. Natchitoches Co.: 1 female, Powhatan, 13-17-VI-1971, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 1 female, Starkville, 9-15-VIII-1970, C. Sartor. All in CGH II.

6. *Ichneumon ambulatorius* Fabricius Map 28

Ichneumon ambulatorius Fabricius, 1775: 329, female. Perkins, 1952:66,67, female. Walkley, 1958:51, female. Heinrich, 1961:242, female, male.



Map 27. *Ichneumon mendax* Cresson

Ichneumon jucundus Brullé, 1846:305, female.

Ichneumon flavizonatus Cresson, 1864:156, male.

? *Ichneumon multor* Cresson, 1867:299, male.

Pterocormus jucundus, Townes and Townes, 1951:299, female, male.

Ichneumon sarcitorius ssp., Heinrich, 1953: 149, female.

Holotypes: *Ichneumon ambulatorius*, male, without data; BM(NH). *Ichneumon jucundus*, female, Inst. of Zoology, Univ. of Torino, Italy. *Ichneumon flavizonatus*, male, Virginia; ANS. *Ichneumon multor*, male, Canada; ANS.

SYSTEMATICS: This probably is the American vicarious form of the Palearctic species *sarcitorius* Linnaeus. Although both sexes of the American population are, as a rule, rather different in color from the latter species, sporadically individual females, as well as males, are found which barely can be distinguished from *sarcitorius*. See also preamble in Heinrich, 1961:242.

Females are distinguished by black basic color of thorax (with white scutellum) and black basic color of abdomen except red 2nd tergite (exceptionally also 3rd tergite) and apical white bands on tergites 3, 4 and 6 (exceptionally also 7th), males by apical white bands on all tergites, except sometimes the 5th.

FEMALE: Length 10-13 mm. Head black, with ferruginous frontal and vertical orbits, often also malar space, apex of cheeks, and clypeus in part; thorax black, subalarum and scutellum white; abdomen tricolored, its basic color black, the 2nd tergite always, the 3rd exceptionally red; tergites 3, 4 and 6, rarely also the postpetiole and 5th tergite, exceptionally the 7th, with apical white bands; legs red, all coxae black, apically more or less ferruginous; scape and segments 1-5 or 6 of flagellum pale ferruginous, the latter with white annulus on segments 7-13 or 14, apex blackish infuscated.

FLAGELLUM: Filiform, stout, ventrally distinctly flattened and slightly widened beyond middle, barely narrowed at apex, with usually 39-40 segments in eastern populations, the first 1.3 times as long as apically wide, the 6th square, the widest about 1.5 times as wide as long.

HEAD: Temple profile and cheek profile slightly narrowed with slightly curved outlines; malar space a little shorter than width of mandible base; cheeks in lateral view rather wide and moderately convex; upper mandible tooth long and pointed, the lower indicated only by a small notch.

THORAX: Mesoscutum rather flat, densely punctured; notauli basally slightly indicated; area superomedia square or slightly longer than wide.

LEGS: Stout, short; coxae III ventrally finely and fairly densely punctured, with thin, indistinct scopa.

ABDOMEN: Gastrocoeli slightly deepened, fairly small; 2nd and 3rd tergites very densely and rather strongly punctured, opaque.

MALE: Length 14-17 mm. Head and thorax black, the following white: mandibles except teeth, face, clypeus, collare, pronotal ridge (apically or entirely), subalarum, tegulae, scutellum, sometimes postscutellum, usually marks on propodeum (covering areae dentiparae and sometimes also apical 1/2 of areae spiraculiferae and the areae postero-externae), exceptionally marks on pre-scutellar carinae; abdomen black, with apical bands on all tergites, as a rule except on the 5th, the bands on tergites 2 and 3 tending to be wider than on all others, all tending to be narrowed toward the middle, often interrupted medially on the postpetiole and on the 6th and 7th tergites, exceptionally interrupted medially on all tergites; basal part of 2nd tergite sometimes orange instead of black; coxae and trochanters black, coxae I and II

apically, coxae III dorsally, more or less extensively white, trochanters varying from entirely black (sometimes in northern specimens) to entirely white (in southern specimens); femora, tibiae, and tarsi pale yellow, the femora usually orange tinged, apices of femora III and of tibiae III often more or less extensively black; last segments of tarsi III usually infuscated; flagellum dorsally more or less extensively black, ventrally pale ochreous; scape ventrally white, dorsally black, varying to extensively ferruginous.

FLAGELLUM: With longish-oval tyloids on segments 15-22 or 23, the longest reaching close to bases and apices of segments.

DISTRIBUTION (map 28): Newfoundland and Quebec west to British Columbia, south to Georgia and Kansas (CGH II). **GEORGIA.** Banks Co.: 3 males, Horner, 13-14-V-1970, G. Heinrich (CGH II).

HOSTS: *Pseudaletia unipuncta* (Haworth); *Crymodes devastator* (Brace); *Luperina stipata* (Morr.); *Macronoctua onusta* Grote; *Papaipema circumlucens* (Sm.); *Papaipema nebris* (Gn.); *Faronta diffusa* (Walker); *Hydroecia immanis* (Gn.)

7. *Ichneumon versabilis* Cresson Map 29

Ichneumon versabilis Cresson, 1877:161, male. Heinrich, 1959b:208, male. Heinrich, 1961:281-283, female, male.



Map 28. *Ichneumon ambulatorius* Fabricius

Amblyteles (Pterocormus) brittoni Viereck, 1917:347, 348, 358, female.

Pterocormus maius, Townes and Townes, 1951:299, female, male.

Holotypes: *Ichneumon versabilis*, male, New York; ANS. *Amblyteles brittoni*, female, Connecticut, Torrington; Connecticut Agric. Experimental Station, New Haven.

SYSTEMATICS: A species of the *gracilis cornis* group, combining bristle shaped, slender, apically strongly attenuated structure of the flagellum of female, with transverse, large gastrocoeli and thyridia, with the interspace much narrower than 1 of them in both sexes. Size somewhat below average of the genus. Chromatically distinguished in females by uniformly red color of mesoscutum and abdomen (except black petiole), combined with white scutellum and tricolored flagellum. The abdomen of males is black, with only tergites 2 and 3 extensively yellow, the postpetiole sometimes yellow marked. The male from Georgia displays more extensively ivory coxae than northeastern males, the coxae I and II being predominantly ivory, coxae III on dorsal side entirely and ventrally at apex; there is also a yellow mark on mesopleura.

FEMALE: Length 10-12mm. Head black, usually with entire frons and vertex including temple orbits, or at least the frontal and vertical orbits ferruginous; sometimes also facial orbits and cheeks partially, always mesoscutum entirely or predominantly ferruginous; scutellum white; pleura, sterna, and propodeum uniformly black; the following parts of thorax ferruginous: usually apex of pronotal ridge, usually tegulae, sometimes collare and subalarum; abdomen uniformly ferruginous except black petiole; coxae and femora black, tibiae and tarsi ferruginous, apices of tibiae III black; flagellum tricolored; basal segments usually 1-6 or 7 (rarely only 1-3) pale ferruginous, with dorsal white annulus on segments 7 or 8 to 12, 13 or 14, black beyond annulus; scape usually ferruginous, sometimes blackish.

FLAGELLUM: Bristle shaped, moderately long and slender, distinctly flattened on ventral side beyond middle and a trifle widened, fairly strongly attenuated toward apex, with 35-38 segments, the 1st about 2.3 times as long as apically wide, the 7th square, the widest barely 1.5 times as wide as long.

HEAD: Temple profile and cheek profile considerably narrowed, the former with very slightly curved, the latter with straight outline; malar space slightly longer than width of mandible base.

THORAX: Mesoscutum slightly convex, distinctly and fairly densely punctured, shiny; notauli basally indicated; scutellum somewhat raised above postscutellum, dorsally nearly flat.

LEGS: Moderately stout; coxae III ventrally densely and finely punctured, with thin, somewhat indistinct scopa.

ABDOMEN: Fairly broad, 2nd tergite apically wider than medially long, the 3rd usually more than twice as wide as long; gastrocoeli large, rather deep, with strongly narrowed interspace and with pronounced thyridia.

MALE: Length 12-14mm. Black, the following ivory: mandibles except teeth, face, clypeus, frontal orbits (usually up to level with lower ocellus only), usually collare, subalarum, apex or entire length of pronotal ridge, scutellum, rarely postscutellum, tegulae in part or entirely, almost always marks on coxae I, usually also on coxae II, usually all trochanters, always all tibiae and tarsi (except broadly black apex of tibiae III and usually more or less infuscated apex of tarsi III), femora I and II usually on anterior side toward apex; abdomen black, postpetiole often with apical ivory band or apico-lateral marks; 2nd and 3rd tergites extensively ivory, each basally and apically, usually also laterally narrowly either reddish or blackish infuscated, and tending to develop a longitudinal, infuscated median line of variable width and shape; all infuscations less extensive and intensive on 2nd tergite than on 3rd, the latter sometimes predominantly blackish, with only a yellowish patch on each side; flagellum black, ventrally brown to pale ochreous, scape ventrally ivory.

FLAGELLUM: With elongate-oval, narrow tyloids on segments 6 or 7 to 16 or 17, the longest reaching from bases to apices of segments.

DISTRIBUTION (map 29): Atlantic to Continental Divide in Canadian Zone and cooler part of Transition Zone (Townes and Townes, 1951). GEORGIA. 1 male, Mt. Blood, Chattahoochie State Park, 19-V-1970, L. Dondero (CGH II).

HOSTS: *Euphydryas phaeton* (Drury), *Polygonia faunus* (Edw.), *Lycena hypophlaeas* (Bdvl.) (Townes and Townes, 1951, records for *Ichneumon maius*). (As the diagnosis of the parasite species was not yet clearly defined and understood at the time of the publication of the host records mentioned above, their authenticity remains questionable and needs further confirmation.)



Map 29. *Ichneumon versabilis* Cresson

8. *Ichneumon grandisops* Heinrich Map 30

Ichneumon grandisops Heinrich, 1961:305-306, female.

Ichneumon grandisops Heinrich, 1971:970-971, male.

Holotype: female, New York, Ithaca, CNC. Allotype: male, New Concord, Ohio; CGH II.

SYSTEMATICS: One of the largest species of the genus, distinguished by deeply infuscated wings, black legs, and red tergites 2-7.

FEMALE: Length 16-18mm. Head black; ferruginous are: at least frontal and vertical orbits, sometimes also sides of the face and the clypeus partially, rarely entire face and cheeks. Thorax including scutellum black. Abdomen dark red, except black 1st segment. Legs black, tibiae I ventrally ivory or reddish. Flagellum black, with white annulus on segments 6 or 7 to 15, 16 or 17; scape ventrally more or less extensively ferruginous.

FLAGELLUM: Bristle shaped, moderately slender, ventrally distinctly flattened and somewhat widened beyond middle, considerably attenuated toward apex; with 45-46 segments, the 1st twice as long as apically wide, the 9th or 10th square, the widest about 1.3 times as wide as long on the flat side.

MALE: (Specimen from Ohio). Length 18mm. Abdomen dark red, except black 1st

segment. Head, thorax, and legs black, except the following white: lateral fields of face, sides of clypeus, mandibles extensively, apical margins of 1st trochanters, 2nd trochanters I and II, 2nd trochanters III ventrally, tibiae and tarsi I and II ventrally, apices of femora I and II ventrally, base of tibiae III ventrally, and scape ventrally. Flagellum uniformly black.

DISTRIBUTION (map 30): Connecticut, New York, Ohio, North Carolina, Georgia. GEORGIA: Mountains of northern Georgia: 1 female, hibernating, R. Duffield (EUM).

9. *Ichneumon pumiliops* Heinrich Map 31

Ichneumon pumiliops Heinrich, 1961:276-277, female.

Holotype: female, Quebec, Gatineau; CNC.

SYSTEMATICS: One of the smallest species of the genus. In structure of flagellum and femora closely related to *nigrovariegatus* Provancher, but distinctly smaller, with comparatively wider gastrocoeli, less elongate abdomen and thorax, and with narrower head. More constant in color pattern.

FEMALE: Length 5-6mm. Head predominantly or entirely black, often apex of clypeus and a small, median mark on face obscure ferruginous, sometimes also a ferruginous or whitish spot on facial orbits, level with antennal sockets. Thorax black,



Map 30. *Ichneumon grandisops* Heinrich

the mesoscutum and scutellum ferruginous, as are also collare, tegulae, apex of pronotal ridge, postscutellum, and exceptionally subalarum; rarely, the mesoscutum partially infuscated. Legs predominantly light rufous; usually more or less infuscated are: all coxae ventrally to entirely, trochanters partially, and femora I and II dorsally; apex of tibiae III and sometimes of femora III black, the latter usually predominantly black; tarsi III usually slightly infuscated apically. Abdomen usually uniformly light rufous, sometimes the apical tergites indistinctly infuscated; no apical mark. Flagellum usually black, with apically brown basal segments and with white annulus on segments 7 (rarely 6 or 8) to 10 or 11, exceptionally segments 1-6 ferruginous; scape black, sometimes ventrally brown.

FLAGELLUM: Short, subfiliform, ventrally neither widened nor flattened beyond middle, usually with 23, sometimes with 22 or 24 segments, the 1st 1.3 times as long as apically wide, the 6th square.

HEAD: Temple and cheek profile strongly narrowed behind eyes and toward mandible base, respectively, slightly curved; malar space shorter than width of mandible base; mandibles narrow, with small teeth.

THORAX: Mesoscutum slightly longer than wide, finely and not densely punctured, glossy; notauli obsolete; area superomedia usually about as wide as long.

LEGS: Femora short and thick; coxae III ventrally glossy, rather densely punctured, without scopa.

ABDOMEN: Comparatively shorter than in *nigrovariegatus*. Gastrocoeli shallow, transverse, their interspace slightly narrower than 1 gastrocoelus; 2nd tergite rather finely and not very densely punctured.

DISTRIBUTION (map 31): Quebec, Ontario, Massachusetts, New York, Georgia. GEORGIA. Mountains of northern Georgia: 1 female, hibernating, R. Duffield (EUM).

10. *Ichneumon anonymus* Heinrich Map 32

Ichneumon anonymus Heinrich, 1961:255-256, female.

Holotype: female, Maine, Dryden; CGH II.

SYSTEMATICS: Closely related and similar to *tritatus* Heinrich, but distinguished from the latter by more elongate and more slender basal segments of flagellum and by more narrowed temple profile.



Map 31. *Ichneumon pumiliops* Heinrich

FEMALE: Length 9-13mm. Head black, vertical and frontal orbits down to level with antennal sockets pale ferruginous, usually with a white spot on vertex and another level with antennal sockets, rarely frontal and vertical orbits altogether white, exceptionally ferruginous color extending over clypeus, cheeks and parts of face. Thorax black, scutellum white, subalarum white marked or white, exceptionally postscutellum also white; collare usually ferruginous or white marked. Legs black, the following ferruginous: trochantelli, apex of femor I ventrally, and all tibiae and tarsi, the tibiae, particularly tibiae III, usually apically more or less strongly and extensively blackish infuscated, tibiae III often entirely blackish, the tarsi III sometimes also more or less strongly infuscated. Abdomen red, except black petiole, sometimes also the postpetiole predominantly black, rarely the 3rd tergite with basal black band, the 7th tergite often with more or less distinct apical yellowish mark. Flagellum black, with complete white annulus on segments 6 or 7 to 12; scape black.

FLAGELLUM: Filiform, but very slender, barely attenuated toward apex, ventrally flattened, but not widened beyond middle, with 30-31 segments, the 1st almost 3 times as long as apically wide, the 12th or 13th approximately square.

HEAD: Temple and cheek profile strongly narrowed behind eyes and toward mandibles

respectively, the former slightly curved, the latter straight.

THORAX: Mesoscutum distinctly convex, densely punctured, nearly opaque, anterior 1/3 of notauli distinct; area superomedia square or slightly longer than wide.

LEGS: Moderately slender, femora III fairly stout; coxae III ventrally very densely punctured, without scopa.

ABDOMEN: Gastrocoeli not (as is usual) triangular or transverse, but rather quadrangular, their interspace considerably wider than 1 gastrocoelus.

DISTRIBUTION (map 32): Quebec and Ontario, south to west Virginia and Georgia. **GEORGIA.** Mountains of northern Georgia, 1 female, hibernating, R. Duffield (EUM).

11. *Ichneumon heterocampae* Cushman Map 33

Amblyteles heterocampae Cushman, 1933:2, female.

Pterocormus heterocampae, Townes and Townes, 1951:298, female.

Ichneumon heterocampae Heinrich, 1961:251, female.

Holotype: *Amblyteles heterocampae*, female, Massachusetts; USNM.

SYSTEMATICS: The female is similar to *annulatorius* Fabricius, the most common species in the northeastern states, but is

distinguished by the structure of the flagellum, which is slightly more widened beyond middle and slightly more attenuated toward apex. Distinguished in color by a yellowish median section on dorsal side of all tibiae.

FEMALE: Length 12-13 mm. Head ferruginous, usually with the following black parts: lateral fields of face, antennal cavities, ocellar and occipital regions. Thorax black, the following ferruginous: mesoscutum, pronotal ridge apically or entirely, mesopleura extensively, rarely the horizontal part of propodeum; scutellum and postscutellum white, collare and subalarum varying from white to ferruginous. Legs black, trochantelli, tibiae, and tarsi ferruginous, the tibiae medially on dorsal side more or less distinctly yellow, tibiae III or II and III apically and sometimes narrowly also at base, blackish infuscated, as are usually also apices of tarsal segments III; exceptionally femora III basally and dorsally, femora I and II predominantly, ferruginous. Abdomen ferruginous, except black petiole or, exceptionally, entire 1st segment. Flagellum black, with white annulus on segments 7 or 8 to 13 or 14; scape sometimes ventrally, rarely entirely, ferruginous.

FLAGELLUM: Subfiliform, fairly stout, ventrally flattened and distinctly widened beyond middle, moderately attenuated toward apex, with 35-36 segments, the 1st 1.5 times as long as apically wide, the 6th or 7th square, the widest about twice as wide as long on the flat side.

HEAD: Temple and cheek profile a little more narrowed, behind eyes and toward mandibles respectively, than in *annulatorius*, the former slightly curved, the latter almost straight; malar space nearly as long as the width of mandible base.

THORAX: Mesoscutum moderately densely punctured, glossy, notauli basally slightly indicated; area superomedia usually square.

LEGS: Rather stout, femora III thick but slightly longer than in *annulatorius*; ventral side of coxae III polished, with scattered punctures, without trace of scopa.

ABDOMEN: Gastrocoeli triangular, moderately deep, their interspace somewhat wider than 1 of them.

DISTRIBUTION (map 33): Quebec and Ontario, south to northern Georgia, west to Ohio. **GEORGIA.** Bartow Co: 1 female, hibernating, R. Duffield (EUM).

HOST: *Heterocampa guttivitta* (Walker); holotype.



Map 32. *Ichneumon anonyms* Heinrich



Map 33. *Ichneumon heterocampae* Cushman

12. *Ichneumon devinctor* Say Map 34

Ichneumon devinctor Say, 1825:248, female.
Heinrich, 1961:262-264, female, male, variability-tables.

Ichneumon tibialis Brullé, 1846:300, female.

Ichneumon montivagans Cresson, 1865b:255, male.

Pterocormus devinctor, Townes and Townes, 1951, 4:298, female, male.

Holotypes: *Ichneumon devinctor*, female; lost. *Ichneumon tibialis*, male, Colorado; ANS.

FEMALE: Length 19-20mm. Black, tergites 2-7 light red. Wings moderately infuscated. The following white: frontal orbits more or less extensively, collare, scutellum (usually except base), broad annulus on all tibiae, on the segments 1 of tarsi I and on segment 1 or 1 and 2 of tarsi II and III, and segments 8-16 or 17 of flagellum. 7th tergite often with small apical yellowish mark.

FLAGELLUM: Relatively short, subfiliform, ventrally not distinctly flattened and not widened beyond middle, little attenuated toward apex, with 37-39 segments; the 1st twice as long as wide, the 7th square.

HEAD: Temple profile and cheek profile barely narrowed behind eyes and toward mandible base, respectively, the former with strongly, the latter with slightly curved outline. Head in front view approximately

square; cheeks distinctly inflated, constricted toward carinal junction which forms an almost right angle and is raised into a distinct projection.

THORAX: Mesoscutum finely and sparsely punctured, glossy. Scutellum flat. Area superomedia large, approximately quadrangular, usually slightly narrowed toward area posteromedia. Lower part of pleura transversely wrinkled.

LEGS: Fairly stout. Coxae III ventrally moderately densely punctured, without scopa.

ABDOMEN: Somewhat elongate and fairly narrow. Median field of postpetiole well defined and finely, longitudinally striate. Gastrocoeli triangular, moderately deepened. 2nd and 3rd tergite moderately strongly and densely punctured.

MALE: Length 20-21mm. Black, abdomen light red, except 1st segment. Wings moderately to strongly infuscated. The extent of white markings unusually variable: white on scutellum more reduced than in female, sometimes absent; tibiae I and tarsi I and II always white banded; white on tibiae III and tarsi III usually reduced, often absent; trochanters usually white marked; usually white marks on apex of femora I and II, on mandibles and on subalarum. The following are white: face entirely or predominantly, clypeus, frontal orbits, and collare.

FLAGELLUM: With very small, narrow, short-oval tyloids on segments 8 or 9 to 17 or 18, the longest scarcely covering 1/2 of the length of segments and reaching neither their base nor their apex.

DISTRIBUTION (map 34): Ontario, west to North West Territories and Alberta, south to Georgia. GEORGIA. Bartow Co.: 1 female, hibernating, R. Duffield (EUM); Atlanta, Gainesville, Neel Gap, Ringgold, Tiger: no specimens, P. W. Fattig, 1950.

HOST: *Sthenopsis thule* (Str.).

4. Genus *Chasmias* Ashmead

Chasmodes Wesmael, 1844:13,15 (name preoccupied).

Chasmias Ashmead, 1900:17 (new name). Townes and Townes, 1951:292. Heinrich, 1961:373. Townes, et al. 1961:381, 382, 466. Townes, et al., 1965:458.

Type species: *Ichneumon motatorius* Fabricius.

SYSTEMATICS: Rather closely related to the genus *Ichneumon* Linnaeus (= *Pterocormus* Foerster). Males can scarcely be



Map 34. *Ichneumon devinctus* Say

distinguished from the latter genus, while females differ more clearly, particularly by the structure of clypeus, which is apically truncate in *Ichneumon*, but more or less distinctly emarginate in *Chasmias*. Females also differ from *Ichneumon* by narrower, more elongate abdomen and stronger head, with short filiform flagellum, all these being evidently adaptive characters, connected with the host specialization (see below) and not shared by the males. In the latter sex the clypeus is not tangibly emarginate but more coarsely punctured than in *Ichneumon*, the punctures showing the tendency to run into irregular longitudinal striae toward the apex of clypeus.

The 2 species, *lugens* Gravenhorst (Europe) and *saucius* Cresson (North America) often included in the genus *Chasmias* are not parasites of stem-boring Noctuidae, but of Aegeriidae, and their females do not show the characteristic features of that genus. I prefer to attribute them to the genus *Ichneumon* rather than to *Chasmias*, but they may deserve generic distinction.

The genus *Ogulnia* Cameron (Himalayan Zone) synonymized by Townes, *et. al.* (1961) with *Chasmias* I prefer to maintain, with at present 4 species (Heinrich, 1965b:159-163). Nor do I see an urgent need to synonymize the genus *Pseudochasmias* Uchida, which differs in an extraordinary genal structure, though otherwise obviously related to

Chasmias, as already indicated by the author's choice of name. As to *Thascia* Cameron, I have no comment, as I have not seen the type yet; the genus is based on a species sympatric with the type of *Ogulnia* Cameron, both from Darjeeling, Himalaya.

Another group related closely to *Chasmias* inhabits Africa (*Procerochasmias* Heinrich)

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females filiform, fairly short and slender, not attenuated toward apex, not tangibly widened beyond middle; of males likewise fairly short, with short row of small nearly bacilliform tyloids, slightly nodose beyond middle.

HEAD: Temple and cheek profiles not or moderately narrowed behind eyes and toward mandible base, respectively, the former distinctly curved; cheeks in lateral view broad, strongly convex, the carina genalis straight and parallel to posterior margin of eyes, down to carinal junction, then abruptly curving forward to mandible base; mandibles robust, rather wide, with fairly short, strong teeth, the upper not much longer than the lower; malar space distinctly shorter than width of mandible base; apical margin of clypeus in females slightly and gradually emarginate from side to side, not bisinuate, that is: not tangibly projecting in the middle, of males practically straight, but coarsely punctured, the punctures tending to be confluent toward apex of clypeus, sometimes into longitudinal irregular furrows; median field of face distinctly protruding and laterally clearly defined.

THORAX: Mesoscutum distinctly longer than wide; anterior third of notauli rather distinct, sternaui indicated; scutellum somewhat raised above postscutellum, laterally not carinate; areae posteromedia somewhat longer than horizontal part of propodeum medially; carination of propodeum complete and distinct, only costulae sometimes indistinct; area superomedia in both sexes usually distinctly longer than wide, with costulae before middle, usually approximately parallel sided or slightly narrowed toward apex; areae dentiparae elongate and, in American species, distinctly slanting toward coxae III; all pleura coarsely and densely punctured, excluding small area of speculum, which is more sparsely punctured, sometimes smooth.

LEGS: Moderately short; coxae III in females (American species) with scopa.

WINGS: Nervulus slightly postfurcal; areolet pentagonal, strongly narrowed in front; radius practically straight.

ABDOMEN: Of females oxypygous, fairly long and narrow; ovipositor usually slightly projecting; postpetiole with distinct median field, which is finely, often indistinctly longitudinally striate and/or sometimes sparsely and finely punctured, the lateral fields coarsely and densely punctured; gastrocoeli triangular, of moderate size and depth, with distinct thyridia, their interspace, particularly in males, sometimes striate; 2nd and 3rd tergites more or less finely and densely punctured, in males usually more coarsely than in females.

CHROMATIC CHARACTER Basic color of body black, or (in European species) anterior tergites sometimes red; tergites 7 or 6 and 7 in females white marked, not so as a rule in males. Wings in American species strongly and evenly infuscated; head and thorax without white markings, except usually scutellum, and in males sides of face.

DISTRIBUTION: Holarctic Zone: 1 species in North America, 2 in Europe, and 5 in the eastern Palearctic Zone.

HOSTS: Cryptophagous larvae of Noctuidae, boring in stems of Gramineae, as in Europe the genus *Nonagria*, in North America the genera *Papaipema*, *Achatodes*, and *Parapamea*.

1. *Chasmias scelestus* (Cresson)

Fig. 18-20, Map 35

Ichneumon scelestus Cresson, 1864:148, female.

Chasmias scelestus, Townes and Townes, 1951:292, female. Heinrich, 1961:374-375, female, male.

Holotype: female, Illinois; ANS. Neallotype: male, Maine; CGH II.

SYSTEMATICS: In structure a quite typical species of the genus; larger than the 2 European species, and particularly distinguished by the strongly and evenly infuscated wings in both sexes. All specimens known from Florida are markedly larger than northern specimens, have more restrictedly (or not at all) white-marked scutella, slightly coarser sculpture of tergite 4, and a few more flagellar segments.

FEMALE: Length 13-17mm. Uniformly deep black, including legs; white are only: anterior side of tibiae I, apex of femora I on interior side, longitudinal median mark on the 7th tergite, usually a median, narrow, transverse apical band on the 6th, and a more or less extensive mark on the scutellum (reduced to a small apical dot in both specimens from Florida); wings uniformly

deeply infuscated; coxae III with distinct brown scopa; flagellum with white dorsal annulus on segments 6 or 7 or (rarely) 8 to 11 or 12; scape entirely black.

FLAGELLUM: With 26-28 segments, the 1st about 3 times as long as apically wide, in lateral view the 9th or 10th square, none wider than long.

HEAD: Temple profile rather strongly curved, cheek profile only slightly so; malar space distinctly shorter than width of mandible base; apical border of clypeus (fig. 18) slightly emarginate from side to side (seen best when head is tilted somewhat backward); face and clypeus coarsely and fairly densely punctured, frons above antennal cavities very densely rugose punctate, cheeks sparsely punctured.

THORAX: Mesoscutum densely punctured, finely coriaceous between punctures, subopaque, scutellum more sparsely punctured; costulae usually indistinct (fig. 19); areae dentiparae more slanting toward coxae III than in type species.

LEGS: Coxae III with scopa.

ABDOMEN: Median field of postpetiole in northern populations usually nearly smooth, in specimens from Florida with some fine longitudinal rugosity and with scattered

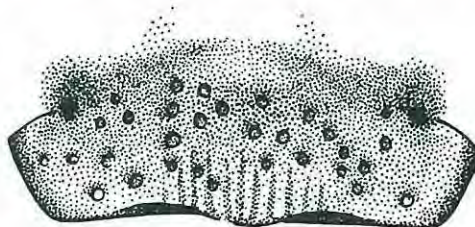


Fig. 18. *Chasmias scelestus* (Cresson) (female). Clypeus, frontal view.

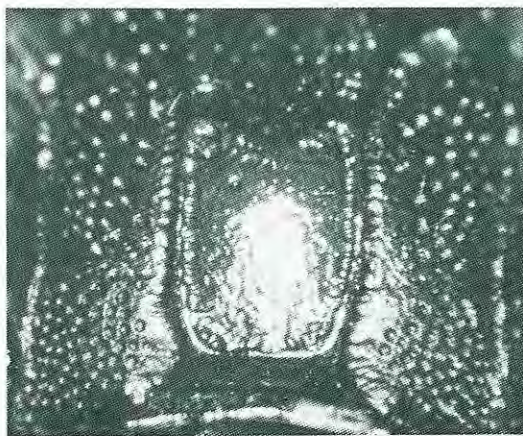


Fig. 19. *Chasmias scelestus* (Cresson) (female). Propodeum, dorsal view.

punctures; 2nd and 3rd tergites moderately strongly and rather densely punctured; puncturation on basal 1/2 of the 4th tergite extremely fine in northern populations, somewhat more distinct in Florida specimens.

MALE: Length 16-17mm (northern populations); 17-19mm (southern populations). Uniformly deep black including legs; tergites 6 and 7, in contrast to female, without white marks; white on legs I and on scutellum as in female, the scutellum in specimens from Florida sometimes entirely or almost entirely black; facial orbits in contrast to female broadly white; wings uniformly and deeply infuscated; flagellum with dorsal white annulus on segments 10-14 (in all specimens at hand from Canada as well as from Florida); scape entirely black.

FLAGELLUM: With 27-28 segments in northern specimens, 30-31 in the 3 specimens from Florida, and with short, narrowly oval tyloids on segments 6-11, the longest, on segments 7-9, covering only the median 1/2 of length of segments.

HEAD: Malar space slightly less than 1/2 as long as width of mandible base; apical margin of clypeus practically straight, imperceptibly projecting medially; clypeus coarsely punctured, the punctures toward apical margin usually running into irregular longitudinal striae (fig. 20).

THORAX: Area superomedia on the average shorter than in female; costulae usually more distinct.

ABDOMEN: Space between gastrocoeli with short striation, the striae from both sides converging toward middle; puncturation on 4th tergite, as in females, somewhat coarser than in northern specimens.

DISTRIBUTION (map 35): Atlantic west to Illinois and Wisconsin, from Ontario and Quebec south to Florida. FLORIDA. Clay Co.: 1 male, Green Cove Springs, 17-V-1967, C. F. Zeiger, ex pupa *Arzama* species on spadderdock, *Nuphar luteum* (Linnaeus) Sibthorp and Smith, (FSCA). Collier Co.: 1

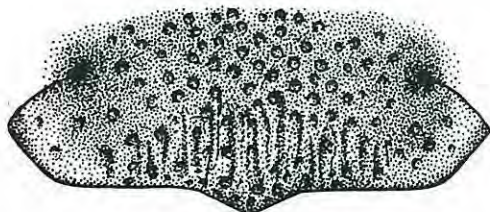


Fig. 20. *Chasmias scelestus* (Cresson) (male). Clypeus, frontal view.



Map 35. *Chasmias scelestus* (Cresson)

male, 1 female, Copeland, 6-18-VI-1967, G. Heinrich. Highlands Co.: 1 female, Highlands Hammock State Park, 25-IV-1968, G. Heinrich. Lee Co.: 1 male, Fort Myers, 21-IV-1968, D. Radkte (all specimens CGH II).

HOSTS: All Noctuidae: *Papaipema cataphracta* (Grote), *P. impecuniosa* (Grote); *Parapamea buffaloensis* (Grote); *Achatodes zae* (Harris); *Arzama* species.

ECOLOGY: Low, rank vegetation, particularly in humid, wooded lowlands.

5. Genus *Orgichneumon* Heinrich Fig. 21

Orgichneumon Heinrich, 1961:15, 95. Heinrich, 1965a:128-130 (2 new species from Burma). Townes, et al. 1965:429 (2 species from Japan and Korea).

Type species: *Ichneumon calcatorius* Thunberg; original designation.

SYSTEMATICS: In general appearance, color pattern, and structure similar to *Coelichneumon* Thomson, but decisively distinguished from the latter genus and the entire tribe Protichneumonini by structure of propodeum; the propodeum shows the clearly broken type of the tribe Ichneumonini, with the areae dentiparae not curved downward. Within the tribe Ichneumonini this genus comes closest to *Steinichneumon* Thomson, differing from it mainly by the peculiar shape

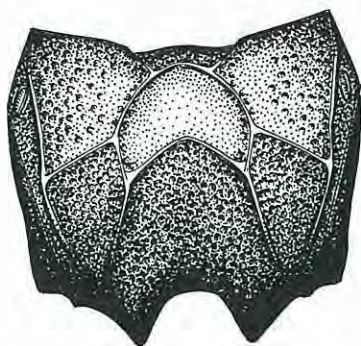


Fig. 21. *Orgichneumon calcatorius* (Thunberg) (female). Propodeum, dorsal view.

of the carination (fig. 21) of the propodeum as described below, the slightly arched apical margin of the clypeus, and the strongly aciculate middle of 2nd tergite. Nearctic females have been found hibernating, a biological character which confirms the tribal position of the genus.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, slender, strongly attenuated toward apex, ventrally flattened beyond middle, but barely widened; of males moderately nodose, segments with distinct, transverse, subapical bristle ridges on ventral side, with row of distinct narrow tyloids.

HEAD: Normal, temple and cheek profiles moderately narrowed behind eyes and toward mandible base, respectively; apical margin of clypeus not, as usually, straight cut or emarginate, but forming a continuous, flat bow; mandibles gradually narrowed from the base to the pointed apex, with small, almost rudimental subapical tooth.

THORAX: Mesoscutum distinctly longer than medially wide, very densely punctured, subopaque; anterior 1/3 of notauli moderately distinct; scutellum raised above postscutellum, dorsally convex, apically declivous toward postscutellum, laterally slightly carinate at the extreme base; area superomedia large (fig. 21), arched in front, in females approaching usually a horseshoe shaped outline, in males strongly abbreviated, 2-4 times as wide apically as medially long and thus often sickle shaped; areae dentiparae obliquely declivous but not curved downward as in *Coelichneumon*.

LEGS: Moderately long; coxae III of females without scopa.

WINGS: Nervulus interstitial or slightly postfurcal, areolet strongly narrowed in

front, the intercubiti almost coalescent; radius sinuate.

ABDOMEN: Median field of postpetiole clearly delimited, basally more or less strongly raised, particularly in males, coarsely aciculate; gastrocoeli large and deep, with pronounced thyridia, their interspace narrower than 1 of them, coarsely longitudinally striate; in females also the middle of tergites 2 and 3, in males of tergites 2-4 with longitudinal striation.

CHROMATIC CHARACTERS: Basic color black, with moderate to very rich white or yellow markings on head, thorax, and legs; usually postpetiole with so colored apical band.

DISTRIBUTION: Holarctic Region.

HOSTS: In North America, *Heterocampa* species (Notodontidae).

1a. *Orgichneumon calcatorius* *calcatorius* (Thunberg)

Ichneumon calcatorius Thunberg, 1822:254, female.

Ichneumon otiosus Say, 1828:69, female. Townes and Townes, 1951:303, female.

Ichneumon infidelis Cresson 1867:296, male.

Ichneumon sylvanus Holmgren, 1880:27, female (nec male). Berthoumieu, 1894-1896:44, female.

Ichneumon (Stenichneumon) calcatorius, Schmiedeknecht, 1928:218.

Ichneumon burkei Viereck, 1910:383, male.

Pterocormus burkei, Townes and Townes, 1951:297, male.

Pterocormus infidelis, Townes and Townes, 1951:299, male.

Coelichneumon calcatorius, Heinrich, 1953:148, female, male.

Intermedichneumon calcatorius, Heinrich, 1956:647-648, female, male. Heinrich, 1959b:211, male.

Orgichneumon calcatorius, Heinrich, 1961:95-98, female, male.

Holotypes: *Ichneumon calcatorius*, female, Sweden; University of Upsala, Sweden. *Ichneumon otiosus*; lost. *Ichneumon burkei*, male, Wisconsin, USNM. *Ichneumon infidelis*, male, Connecticut; ANS. *Ichneumon sylvanus*, male, NRMS.

SYSTEMATICS: The species is extremely rare in Europe and the European male is not known at all; the few European females I had the opportunity to examine, show a narrower white band on frontal orbits than specimens

from northeastern North America, and the white on pronotal ridge is more restricted; these differences seem too subtle for subspecific separation, especially since the small number of specimens known from Europe does not reflect the width of individual variability of the population.

A handsome species, 11-19mm long, black, with rich white markings (of geographically widely varying extent) on head, thorax, and legs. All tibiae always with broad, white ring beyond base; almost always white are also scutellum entirely or in part, pronotal ridge entirely or apically, subalarum, and frontal orbits.

Populations from southeastern North America are marked with much more white than the northeastern specimens which approach the darker, Palearctic pattern; the latter are therefore attributed below to the nominate form, while the population of southeastern North America is treated as a new subspecies.

FEMALE: Length 11-17mm. Black, the following white: frontal orbits more or less broadly, stripe on temple orbits, collare, pronotal ridge entirely or toward apex only, subalarum, scutellum except basally, postscutellum, apical mark on postpetiole, and dorsal or complete annulus on all tibiae beyond base; sometimes also white: facial orbits, mark on lower outer orbits, mark on metapleura, small marks on coxae II and III, and dorsal stripes on anterior segments of tarsi III; flagellum with white, nearly complete annulus on segments 7 to 12 or 13; coxae I and mesoscutum not white marked.

FLAGELLUM: With 38-42 segments, the 1st about 3 times as long as apically wide, in lateral view the 12th square.

MALE (Description based on North American specimens only): Length 13-16mm. White pattern generally as in female, but more extensive; face and clypeus predominantly white, both with longitudinal median black band or mark; white band on temples extended over entire length of exterior orbits and widened below before mandible base over width of cheeks; white are, in addition to white marking described for female: mark on mandible base, marks on tegulae, mark on exterior side of prepectus, marks on metapleura, coxae I and II apically, dorsal mark on coxae III, anterior segments of tarsi (usually of segments 1-3 of tarsi III, 1-2 of tarsi II, and 1 of tarsi I) dorsally except bases and apices; sometimes a small mark on posterior part of mesopleuron, and 2 small median spots on mesoscutum; postpetiole

usually with broad apical white band; flagellum usually without, sometimes with narrow, dorsal, white annulus.

FLAGELLUM: With elongate, narrowly-oval tyloids on segments 8 or 9 to 18 or 19, the longest covering more than median 1/2 of segments.

DISTRIBUTION: Europe. Sweden (type locality), Croatia (var. *nigritarsis* Schmi-edecknecht), eastern Alps (CGH II); Eastern North America. Nova Scotia and New Brunswick west to British Columbia, south to the Carolinas.

HOSTS: *Orgyia antiqua* (Linnaeus) (Quebec) and *Orgyia leucostigma* (J. E. Smith) (Nova Scotia and New Brunswick).

**1b. *Orgichneumon calcatorius*
albidior, new subspecies
Map 36**

SYSTEMATICS: Differs from the nominate form by considerably greater extent of white marks on thorax, head, and legs, as especially apparent in both sexes on the mesopleura.

One male from Tennessee is, in the white color pattern, intermediate between *albidior* and the nominate form.

Orgichneumon mirus Heinrich (1965a:128-129) described from Northeastern Burma, 7000 ft., shows a striking similarity in color pattern and structure with *calcatorius albidior*, differing from the latter by markedly finer sculpture of tergites and in color by a broad, white crossband on exterior side of femora III and by white areae dentiparae.

FEMALE: Length 14-18mm. Orbits white around eyes, white band widened below lower ocellus, on face and also over almost entire width of cheeks, very narrowly interrupted only on malar space; mesopleuron with 2 large, white marks together covering more than 1/2 of its surface, the anterior mark including exterior section of prepectus; metapleuron extensively to nearly entirely white; mesoscutum with 2 short, apically confluent, median white bands; coxae I and II extensively to predominantly white, as is also dorsal surface, or more, of coxae III; femora I and II with apical white mark on anterior side; white on dorsal side of tibiae II and III extending to beyond middle or close to their apices, and on tibiae I occupying entire length of anterior side; segments 1-3 of tarsi III and 1-2 of tarsi I and II dorsally white, except black bases and apices; flagellum with complete white

annulus on segments 6 or 7 to 13 or 14; otherwise as in nominate form.

FLAGELLUM: With 40-43 segments.

MALE: Length 16-19mm. Face and clypeus uniformly white, or almost so; white band around orbits not, or narrowly interrupted on vertex, widened below over entire width of cheeks; mesopleura usually predominantly white, with only area of speculum and band below subalarum black, the white color also including exterior section of prepectus and often emitting a band onto mesosternum along sternaui; sometimes, as in female, white on mesopleuron divided into 2 large, separated patches by a narrow black crossband; also white are: base of mandibles, collare, subalarum, tegulae, entire pronotal ridge, usually apex of pronotal base, 2 median, short, apically confluent bands on mesoscutum, usually also a narrow band on exterior side of mesoscutum near tegulae, apex of mesosternum, metapleura predominantly or entirely, scutellum, postscutellum, exceptionally marks on areae spiraculiferae, areae posterexternae, and on area postero-media, broad apical band on postpetiole, coxae I and II nearly entirely, coxae III dorsally entirely and often apically on ventral side, dorsal marks on 1st trochanters I and II, sometimes also on 1st trochanters III, femora I and II on anterior side except basally, apico-lateral mark on femora III or (in specimens from Tennessee and Arkansas) long, longitudinal, dorsal band on femora III, dorsal side of all tibiae entirely except narrowly black bases and sometimes black apex of tibiae III, segments 1-3 or sometimes to 4 of tarsi I-III dorsally (except black bases and apices), and flagellum with dorsal or complete white annulus on segments 7 or 8 to 15 or 16; scape sometimes with apical white mark on ventral side.

FLAGELLUM: With elongate, narrowly-oval tyloids on segments 7 or 8 to 17 or 18.

Holotype: female, Florida, Highlands Co., Highlands Hammock State Park, I-IV-1970, D. Radtke. **Allotype:** male, Florida, Highlands Co., Archbold Biological Station, 7-V-1967, G. Heinrich. **Paratypes:** FLORIDA. Clay Co.: 1 female, Gold Head Branch State Park, 3-5-VII-1972, D. Radtke. Lee Co.: 1 male, Ft. Myers, 25-IV-1968, D. Radtke. GEORGIA. Monroe Co.: 2 females, 28-V-24-VI-1970, Forsyth, F. Naumann. TENNESSEE. Henderson Co.: 3 males, Natchez Trail State Park, 17-22-V-1972, G. Heinrich, D. Shaneck. (All types in CGH II.)

DISTRIBUTION (map 26): Florida, Georgia, Tennessee, and Arkansas. In addition



Map 36. *Orgichneumon calcatorius albidior* n. subsp.

to the type specimens, I have seen the following: ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 17-22-V-1972, G. Heinrich, D. Shaneck (CGH II).

6. Genus *Hemihoplisis* Heinrich

Hemihoplisis Heinrich, 1961:15. Heinrich 1962:660. Townes and Townes, 1966:265

Type species: *Hoplismenus teres* Swift; original designation.

SYSTEMATICS: This genus is similar in appearance and in the presence of apophyses on the areae dentiparae to the subtribe *Hoplismenina*, but differs decisively by not convex but completely flat clypeus and in addition by less delicate and less narrowed mandibles, and by larger and deeper gastrocoeli.

It is apparently most closely related to the *gracilicornis* group of the genus *Ichneumon* from which it differs mainly by the more or less conspicuous propodeal apophyses and also by a long ovipositor.

The species *propitius* (Cresson) differs from the type species *teres* (Swift) by somewhat less conspicuous apophyses, less narrowed and not quite straight temple profile and cheek profile, and also slightly in structure of mandibles; it is intermediate between the genus *Hemihoplisis* and the *gracilicornis* group of the genus *Ichneumon* and has been attributed to the latter genus by Heinrich (1961). Under consideration of the otherwise striking congruity of the 2 species in structure, sculpture, color, and even

biology it has been transferred here to the genus *Hemihoplis*. The combination of the following 2 characters is considered as decisive for the determination of the latter genus: (1) propodeum with distinct apophyses which vary in length, (2) tergites 2 and 3 with coarse and dense sculpture, separated from each other by a distinct suture, the 2nd tergite with a smooth and shiny, declivous, apico-marginal band.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, long and very slender, not the least widened beyond middle, with very elongate basal segments; of males with basal segments overlapping one another unusually far on outer side, with short row of indistinct, bacilliform, very narrow tyloids, and without distinct transverse bristle ridges on ventral side.

HEAD: Temple and cheek profiles strongly narrowed behind eyes and toward mandible base, with straight or slightly curved outlines; malar space long, in males slightly longer than width of mandible base, in females nearly twice as long; clypeus flat; mandibles more or less slender, in the type species the subapical tooth considerably shorter than the apical tooth and not completely level with the latter.

THORAX: Mesoscutum longer than medially wide, densely and moderately coarsely punctured, finely coriaceous between punctures, subopaque; notauli barely indicated at base; scutellum laterally not carinate, moderately raised above postscutellum and moderately convex in females, strongly raised and strongly convex in males, carination of propodeum complete and prominent, including costulae, only carinae coxales not quite distinct; apophyses of propodeum more or less conspicuous, moderately long; area superomedia usually longer than wide, with costulae before middle, narrowed from costulae toward area basalis, in males, on the average, somewhat shorter than in females.

LEGS: Long and slender.

WINGS: Nervulus postfurcal and oblique; areolet clearly pentagonal; radius almost straight.

ABDOMEN: Of females oxypygous, the ovipositor markedly projecting; median field of postpetiole clearly defined, usually longitudinally striate; gastrocoeli quadrangular, rather large, rather deeply impressed, with large thyridia, their interspace about as wide as one of them, or slightly

narrower, shortly aciculate; tergites 2 and 3 very coarsely and densely rugose punctate, barely shiny, separated from each other by a marked suture; the 4th tergite in females very finely punctured and extremely finely coriaceous, in males rather coarsely and densely punctured, though slightly less so than the 2nd and 3rd tergites.

DISTRIBUTION: From Maryland, Virginia, and Ohio south to Florida, Georgia, Louisiana, and Tennessee.

HOSTS: *Precis evarete zonalis* (Felder & Felder) (Nymphalidae).

1. *Hemihoplis teres* Swift

Map 37

Hoplismenus teres Swift, 1946:409, 410, female, male. Townes and Townes, 1951:284. *Hemihoplis teres*, Heinrich, 1962:661, female, male.

Holotype: female, Great Falls, Virginia; CHT. Allotype: male, same data; CHT.

SYSTEMATICS: The similarity of this species with the following, *propitius*, is startling. The apophyses of the propodeum are more strongly developed in *teres* than in *propitius* as a rule, but their length is subject to some individual variability, and the opposite extremes of the 2 species approach 1 another. The best character for their distinction is offered in the structure of mandibles, with the subapical tooth being slightly twisted out of level with the apical 1 in *teres*, in normal level with the apical tooth in *propitius*; this difference is more marked in females than in males. Besides, in *propitius* the temples and cheeks are a trifle convex and more curved in profile, in both sexes. In color and sculpture both species are practically identical.

FEMALE (description based on Florida population): Length 9-11mm. Ferruginous, pale yellow are: collare, usually dorsal side of subalarum, and the scutellum; coxae I and II apically faintly yellow tinged; apical margins of 2nd and usually 3rd tergite narrowly blackish infuscated; extreme tip of tibiae III and 5th segment of tarsi III slightly infuscated; flagellum ferruginous, including scape, with yellowish-white annulus on segments 5 or 6 to 11 or 12 (base), section beyond annulus usually more or less distinctly infuscated.

FLAGELLUM: With 35-38 segments, the 1st fully 4 times as long as apically wide, all segments longer than wide.

MALE (description based on Florida population): Length 9-12 mm. Ferruginous;

DISTRIBUTION (*map 37*): Ohio, Maryland, Virginia, North Carolina, Georgia, Florida, Louisiana (Townes, 1951). Material pertinent to the study: FLORIDA. Alachua Co.: 1 female, 18-II-1950 (FSCA). Collier Co.: 6 males, 1 female, Copeland, 12-VI and 18-VII-1967, G. Heinrich (CGH II). Duval Co.: 1 male, Jacksonville, 12-II-1965 (FSCA).



HEAD: Temple and cheek profiles less strongly narrowed behind eyes and toward mandible base, respectively, than in *teres*, slightly curved, cheeks in lateral view more

convex; mandibles somewhat wider than in *teres*, the subapical tooth stronger developed and level with apical tooth.

THORAX: Apophyses of propodeum shorter than in *teres*.

ABDOMEN: Comparatively broader than in *teres*, the 2nd tergite apically usually wider than medially long.

MALE: Extremely similar to the male of *teres* and hardly recognizable except by direct comparison with the latter. Temple profile in vertical view slightly wider and more curved; clypeus in frontal view comparatively wider; tyloids more distinct, elongate oval.

Chromatically also very similar to *teres*, but in northeastern and in 1 Mexican specimen (males from the southeastern states are not recorded yet), on the average, more extensively black marked. The following are usually more or less extensively black: mesosternum, prepectus, areae coxales, scutellar sutures and axillary troughs, ventral side of coxae III, and apical part of femora III.

DISTRIBUTION (map 38): Atlantic to 100° West in Transition and Upper Austral Zones; also Southern Mexico (Townes, 1951; Ontario, Quebec, Maine (Heinrich, 1961). New records: GEORGIA. Clarke Co.: Athens (Nicholson), 1 female, 27-VII-5-VIII, and 2 females, 31-VIII-7-IX-1970, H. R. Hermann (CGH II). TENNESSEE. Henderson Co.: 1 female, Natchez Trail State Park, 14-20-VI-1972, G. Heinrich, D. Shaneck (CGH II).

HOSTS: *Phyciodes tharos* (Drury) (Packard, 1881); *Chlosyne harrisii* (Scudder) (Townes, 1951); *Anemeca ehrenbergii* (Hbn.) in Mexico (Swift, 1946).

7. Genus *Menkokia* Heinrich

Melanichneumon subgenus *Menkokia* Heinrich, 1934:209-211.

Type species: *Melanichneumon* (*Menkokia*) *major* Heinrich; original designation.

Bystra Townes, et al., 1961:357 (partim; *Menkokia* Heinrich as synonym).

Menkokia Heinrich, 1971:971-973.

In the key to the subtribes of the tribe Ichneumonini this genus runs clearly to the subtribe Ichneumonina, where it is distinguished by (1) a moderately raised, dorsally convex and laterally distinctly carinate scutellum and (2) by the type of carination of propodeum (see below) which approaches the carination of the *Melanich-*



Map 38. *Hemihoplis propitius* (Cresson)

neumon group of the subtribe Cratichneumonina.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, fairly long, with elongate basal segments, ventrally flattened and usually widened beyond middle, strongly attenuated toward apex; of males moderately nodose, with distinct, transverse bristle ridges and with a row of distinct tyloids.

HEAD: Occiput and temples declivous from margin of eyes and from ocelli; temple profile more or less strongly narrowed behind eyes; cheek profile distinctly narrowed toward mandible base, straight; malar space somewhat shorter than width of mandible base, mandibles normal, moderately slender.

THORAX: Mesoscutum somewhat longer than wide, fairly convex; notauli obsolete; scutellum moderately raised above postscutellum, dorsally convex, laterally distinctly carinate; propodeum of the clearly broken type, the horizontal part medially slightly shorter than the area posteromedial; carination complete and prominent; area superomedia somewhat longer than wide, hexagonal or semi-elliptic, with costulae approximately in the middle, narrowed from costulae toward area basalis, the latter sometimes indistinct; areae dentiparae with pointed apices; mesopleura with distinct speculum.

LEGS: Fairly slender; coxae III of females without scopa.

WINGS: Areolet pentagonal, strongly narrowed in front, the intercubiti nearly coalescent; nervulus interstitial.

ABDOMEN: Of females oxygyous, the ovipositor usually somewhat projecting; median field of postpetiole more or less distinct, longitudinally striate or rugose; gastrocoeli fairly deep, with distinct thyridia, their interspace wider than 1 of them, and longitudinally striate; rest of tergite 2, and at least the 3rd tergite coarsely and densely sculptured (punctate or rugose punctate).

CHROMATIC CHARACTERS: Basic color black, or red and black; scutellum white, often medially black; tergites 6 and 7 always with apical white marks; anterior tergites, at least the 1st, either with apical white margins or apical bands or latero-apical marks; prescutellar carinae white, usually also mesoscutum with short, median white lines.

DISTRIBUTION Celebes (type locality); Burma (CGH II); North America.

1. *Menkokia blandii* (Cresson)

Map 39

Ichneumon blandii Cresson, 1864:188, male.

Melanichneumon blandii, Townes and Townes, 1951:285, male.

Melanichneumon (Vulgichneumon) blandii, Heinrich, 1962:612-614, female, male.

Menkokia blandii, Heinrich, 1971:972.

Holotype: male, Pennsylvania; ANS. Neallotype: female, North Carolina; CGH II.

FEMALE: Length 10-11mm. Basic color of head, prothorax, mesoscutum, scutellum, and tergites 4 or 5 to 7 black, with rich white pattern; basic color of the rest light red; the following white: entire face and clypeus, orbits broadly around eyes (including malar space and most of cheeks), mandibles except teeth, collare, pronotal ridge and base broadly, subalarum, marks on tegulae, 2 short, median lines on mesoscutum, prescutellar carinae, sides and apex of scutellum, postscutellum, carinal triangle, prosternum except base, exterior belt of prepectus with adjacent area of mesopleura, area on lower, posterior part of mesopleura, apical bands on tergites 1-5, apical marks on tergites 6 and 7, segments 2-4 or 5 of tarsi III; coxae and trochanters I and II extensively to predominantly whitish; tips of femora III and of tibiae III, sometimes also base of tibiae III, narrowly blackish infuscated; metatarsus III, usually except apex, and 5th

segment of tarsi III, usually except base, blackish; metatarsus II also slightly infuscated; flagellum with dorsal white annulus on segments 7-15; scape ventrally orange.

FLAGELLUM: With 37-38 segments, the 1st fully 3 times as long as apically wide, the 9th approximately square, the widest, on the flat side, fully twice as wide as long.

MALE: Length 11mm. Basic color of head, prothorax, mesoscutum, and scutellum black, as in female, and with the white pattern also as in female; in contrast to female basic color of tergites 1-3 black, as is the basic color of the following tergites, rarely tergites 1-2 partially red (particularly in northern specimens); all tergites with apical white bands, the 7th tergite almost entirely white; in contrast to female, as a rule, the 3 basal areas of propodeum and the area superomedia and area posteromedia blackish infuscated or black and the prepectus black except white exterior belt; mesosternum entirely white; coxae and trochanters I and II and trochanters III usually entirely white in southern specimens (only partially white in northern populations); all tibiae blackish infuscated on dorsal side except a restricted brownish area beyond base on tibiae III, the ventral side of tibiae I and II whitish; all tarsi whitish, all metatarsi basally more or less extensively blackish infuscated, the metatarsi III basally black; tips of all femora blackish on dorsal side; flagellum with complete white annulus on segments 14 or 15-26 or 27; scape ventrally white.

FLAGELLUM: With 35-38 segments and with longish-oval, fairly conspicuous tyloids on segments 9-15 or 17, the longest (on segments 11 or 12-14 or 15) almost reaching from bases to apices of segments.

DISTRIBUTION (map 39): Eastern North America from Ontario south to Georgia, west to Arkansas. ARKANSAS. Garland Co.: 6 females, 1 male, Ouachita State Park and Crystal Springs, 16-27-V-1972, G. Heinrich, D. Shaneck (CGH II). GEORGIA. Banks Co.: 1 female, 1 male, Homer, 11-12-V-1970, G. Heinrich, R. Duffield (CGH II). TENNESSEE. Henderson Co.: 2 males, Natchez Trail State Park, 10-26-VI-1972, G. Heinrich, D. Shaneck (CGH II).

8. Genus *Trogomorpha* Ashmead

Fig. 22-24

Trogomorpha Ashmead, 1900:15. Heinrich, 1962:661-662. Townes and Townes, 1966:259 (4 species).



Map 39. *Menkokia blandii* (Cresson)

Type species: *Ichneumon trogiformis* Cresson; original designation.

SYSTEMATICS: The genus apparently does not belong in the tribe Ichneumonini. It is listed here only provisionally and following my previous arrangement (Heinrich, 1962). I am now convinced that *Trogomorpha* is more closely related to the Listrodromini than to the Ichneumonini, a hypothesis also supported by the originally overlooked shape of the areolet, with intercubiti very widely separated in front. On the other hand the area superomedia shows a rather remarkable peculiarity which suggests the possibility of a separate tribal position, possibly in association with *Conopyge* and some other Neotropical genera; the question can be answered only by comprehensive studies of all the genera of the Neotropical Region.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, fairly short, ventrally flattened beyond middle and somewhat widened, moderately attenuated apically; of males strongly nodose by pronounced transverse bristleridges medially on ventral side of segments, the basal segments overlapping each other distinctly on exterior side, with a row of small, short, inobtrusive, narrowly-elliptic tyloids.

HEAD (fig. 22): Temple profile not narrowed behind eyes, broadly curved; cheek profile

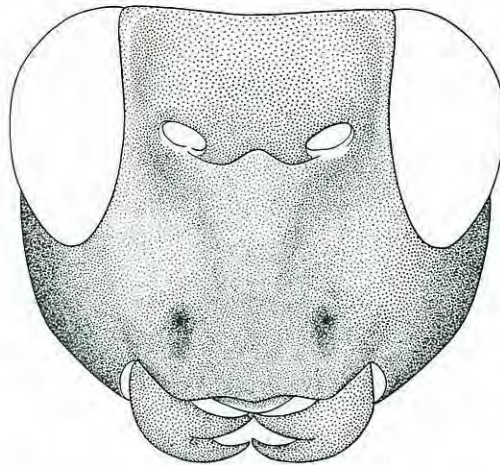


Fig. 22. *Trogomorpha trogiformis* (Cresson) (female). Head, frontal view.

slightly narrowed toward mandibles, slightly curved; malar space in females slightly longer than width of mandible base; cheeks in lateral view wide and strongly convex; mandibles short and very wide, not tapering toward apex, with 2 subequal teeth, separated by a wide deep gap; malar space not longitudinally depressed and thus not clearly separated from face: clypeus flat, with straight apical border; median field of face barely indicated.

THORAX: Mesoscutum slightly longer than medially wide, moderately convex; notauli basally indicated; scutellum distinctly raised above postscutellum in females, considerably so in males; propodeum (fig. 23)

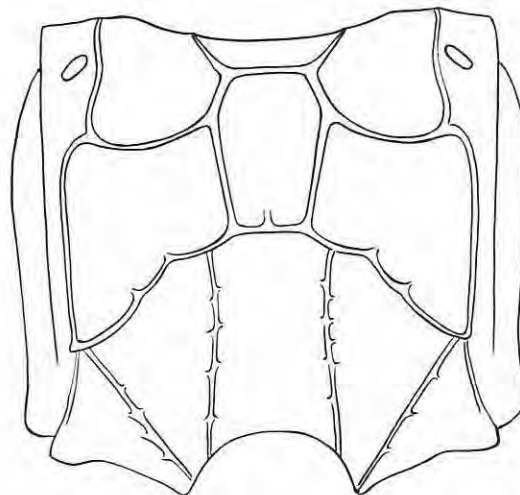


Fig. 23. *Trogomorpha trogiformis* (Cresson) (female). Propodeum, dorsal view.

moderately long, area posteromedia slightly longer than horizontal part medially; area superomedia distinctly longer than wide, coffin shaped, with costulae shortly before area basalis, narrowed from costulae toward the latter, sometimes with an incomplete longitudinal median carina; spiracles comparatively short, elongate elliptic; entire thorax very coarsely and rather densely punctured, or rugose punctate, propleura longitudinally rugose.

LEGS: Fairly slender; coxae III of females with distinct scopa.

WINGS: Nervulus interstitial and nearly vertical; areolet pentagonal, the intercubiti unusually widely separated in front, the 2nd abscissa of cubitus considerably shorter than the first.

ABDOMEN: Of females (fig. 24) oxypygous; postpetiole without distinct median field, coarsely and densely punctured; gastrocoeli fairly small and narrow, triangular, distinctly impressed, with fairly distinct thyridia; tergites 1-4, in males 1-5, strongly sclerotized and very coarsely and densely punctured, separated from each other by pronounced sutures.

CHROMATIC CHARACTERS: Basic color of ferruginous, without white or yellow pattern, in males legs and thorax usually with some black parts; flagellum with white annulus in both sexes; wings strongly infuscated, with or without light bands. Sexual dichromatism not considerable.

DISTRIBUTION: Neotropical region, from Uruguay north to Mexico, Florida, and New Jersey.

HOSTS: The type species has been reported as reared from *Ephyriades brunnea floridensis* Bell and Comstock (Hesperiidae).

1. *Trogomorpha trogiformis* Cresson Fig. 22-24, Map 40

Ichneumon ferrugator Fabricius, 1793:154 (name preoccupied).

Ichneumon trogiformis Cresson, 1864:175, male. Cresson, 1877:175, female, male.

Trogomorpha trogiformis, Townes and Townes, 1951:282. Heinrich, 1962:663, female, male.

Holotype: male, New Jersey; ANS.

FEMALE: Length 12-15mm. Uniformly dark ferruginous; wings uniformly and strongly infuscated, without light bands; flagellum tricolored, black, with complete white (ventrally ferruginous tinged) annulus on segments 7 or 8 to usually 14, segments before annulus ventrally, segments about 1-3 also dorsally ferruginous; scape ferruginous.

FLAGELLUM: Structure as described for the genus; with 37-40 segments, the 1st slightly more than twice as long as apically wide, in lateral view about the 8th segment square, the widest, seen on the flat side, 1.5 to nearly 2 times as wide as long.

MALE: Length 13-16mm. Dark ferruginous; inner orbits at level with antennal sockets faintly yellow tinged; coxae and trochanters III and coxae II, often also trochanters II, more or less extensively infuscated or black; femora III usually slightly infuscated to black; black are: usually prepectus, often apical part of mesosternum, sometimes mesosternum and metapleura; tarsi III pale yellow; wings uniformly and deeply infuscated; flagellum tricolored, black, with complete white (ventrally ferruginous tinged) annulus on segments 11 or 12 or 13 to 17 or 18 or 19, segments before annulus ventrally, segments 1-2 or 3 or 4 also dorsally ferruginous; scape ferruginous.

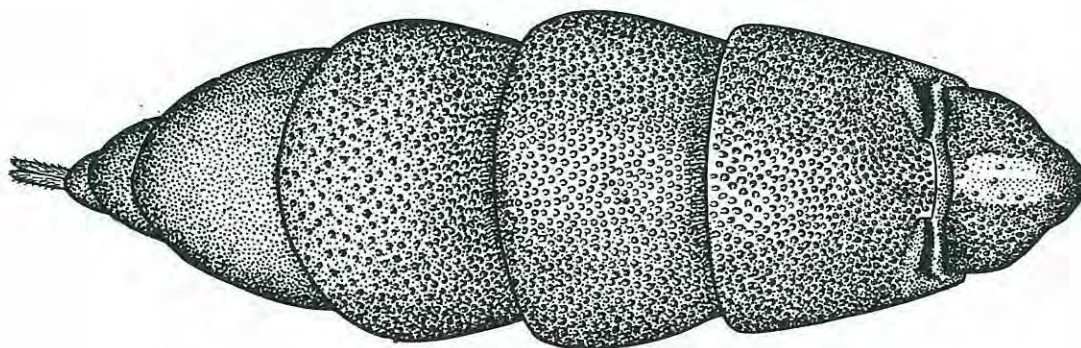


Fig. 24. *Trogomorpha trogiformis* (Cresson) (female). Abdomen, dorsal view.

FLAGELLUM: Structure as described for the genus; with 36-41 segments and with unobtrusive, small tyloids on segments 8 to 22 or 23 or even 25, the longest covering barely the median 1/2 of segments.

DISTRIBUTION (map 40): Florida, west to Louisiana, north to New York. **FLORIDA.** Highlands Co.: 3 females, 1 male, Archbold Biological Station, 26-III-11-IV-1968, and 8 females, 17 males, 7-V-3-VI-1967, G. Heinrich; 2 males, Highlands Hammock State Park, 2-IX-1969, G. Heinrich. Lee Co.: 1 male, Ft. Myers, 9-VI-1967, and 1 female, 1 male, 20-VII-1967, and 1 female 15-IV-1968, G. Heinrich. D. Radtke. Collier Co.: 1 male, Copeland, 9-VI-1967, G. Heinrich. Desoto Co.: 1 female, 1 male, 9-IV-1952, Ft. Ogden, I. R. Vockeroth. Dade Co.: 1 male, Homestead, 5-IV-1952, G. S. Walley; 1 female, Paradise Key Everglades National Park, 1-IV-1952, G. S. Walley. Leon Co.: 2 females and 1 male, Tall Timbers Research Station, 1-17-IV-1968, and 1 female, 17-VII-1969, G. Heinrich. Alachua Co.: 1 male, Gainesville, 22-VII-1969, G. Heinrich. Clay Co.: 1 male, Gold Head Branch State Park, 2-V-1971, C. F. Zeiger. All in CGH II. Duval Co.: 1 male, Jacksonville, 20-XII-1967, C. F. Zeiger, at *Bidens pilosa* Linnaeus, Alachua Co.: 1 female, Gainesville, 5-VIII-1967, R. E. Woodruff, in swimming pool. All in FSCA. **MISSISSIPPI.** Lauderdale Co.: 1 female, Meridian, 23-VI-1970, G. Heinrich. Jackson Co.: 2 males,

Lucedale, 19-VI-1970, G. Heinrich. Oktibeha Co.: 1 male, Starkville, 30-V-9-VI-1971, and 1 female, 26-VI-3-VII-1971, C. Sartor. Yalobusha Co.: 1 female, Water Valley, 20-27-VI-1971, M. Horan. All in CGH II. **LOUISIANA.** Evangeline Co.: 1 female, 1 male, Bayou Chicot, 16-V-5-VI-1971, and 1 female, 2 males, 28-VI-26-VII-1971, D. Shaneck; 2 females, Bayou Chicot State Park, 26-VI-1971, G. Heinrich (CGH II).

HOSTS: *Ephyriades brunnea floridensis* Bell and Comstock (Hesperiidae).

ECOLOGY: Almost ubiquitous, but mainly in open country, as on road sides, railroad banks, clearings, and edges of forests. With *Limonethe maurator* Brullé, the only species of the subfamily found in Florida to be frequent in such biotops, and apparently adapted to the heat and sun radiation of the open country.

II. B. Subtribe Amblytelina (Viereck)

Amblytelinae Viereck, 1918:74.

Type genus: *Amblyteles* Wesmael.

Amblytelina Heinrich, 1967:486, 648.

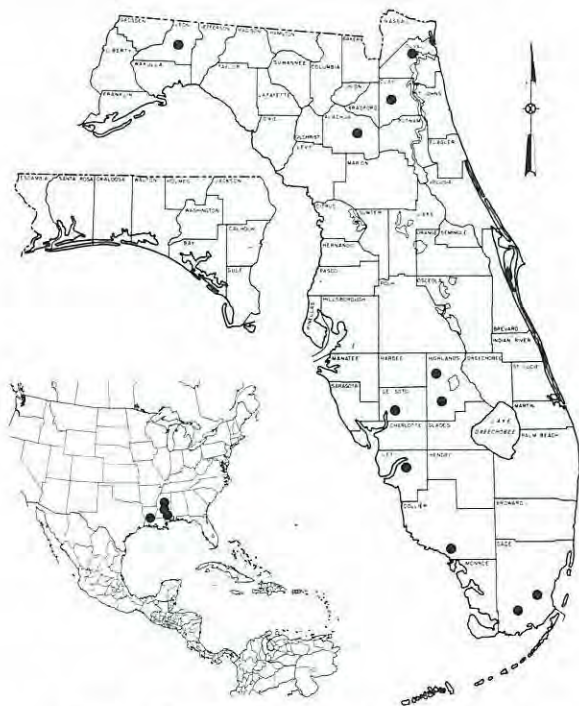
SYSTEMATICS: This subtribe is distinguished by the amblypygous abdomen of females, as a rule in combination with indistinct or lacking thyridia and usually small and superficial gastrocoeli, and with pentagonal areolet. The median field of the postpetiole is usually aciculate or longitudinally rugose, sometimes punctured, while the following tergites tend to be less coarsely sculptured than in the Ichneumonina. The hypopygium of males tends to form median projections in several genera. Coxae III of females without scopa.

Females, as far as known (mainly through the research of Rolf Hinz), deposit their eggs into the larva of the host, in contrast to the Ichneumonina. Some of the species of the Holarctic Region hibernate, others do not.

Key to genera of Amblytelina from Florida and neighboring land areas

MALES

1. First abdominal segment with a distinct elevation; on the bend between petiole and postpetiole; most of the carination of propodeum obsolete. (Postpetiole irregularly rugose punctate; gastrocoeli obsolete; spiracles of propodeum short oval; abdomen black). 19. *Probolus* Wesmael
- First segment without elevation on the bend between petiole and postpetiole;



Map 40. *Trogomorpha trogiformis* (Cresson)

- most or all of carinae of the propodeum distinct. 2
2. Large species, 20-24 mm long; postpetiole densely and very finely punctured; basic color of abdomen black, with bluish tinge, tergites 1-3 with extensive white markings; wings deeply infuscated. 9. *Protopelmus* Heinrich
- Considerably smaller species; sculpture of postpetiole different; color of abdomen different; wings not or only slightly infuscated. 3
3. Flagellum without tyloids (but with pronounced, transverse bristle-ridges on segments); mandibles rather stout, with strong apical teeth, separated by a fairly wide gap, the upper tooth longer than the lower. (Hypopygium with a short, triangular, convex, median projection, its borders all around bending evenly down toward ventral surface of abdomen). 10. *Tricholabus* Thomson
- Flagellum with distinct tyloids; mandibles slender or stout, but teeth never separated by a wide gap. 4
4. Postpetiole polished, glossy; gastrocoeli indicated by a narrow longitudinal impression only. (Tergites 2 and 3 predominantly yellow) *Ectopimorpha wilsoni* Cresson
- Postpetiole with distinct sculpture; gastrocoeli different. 5
5. Hypopygium without median projection, its apical margin forming either a continuous, flat, or moderately curved, arch, or hypopygium medially truncate. 6
- Hypopygium with a distinct, small or considerable, median projection. ... 9
6. Flagellum with distinct, transverse bristle ridges on ventral side ("nodose"). 7
- Flagellum without distinct, transverse bristle ridges on ventral side (not "nodose"). 8
7. Gastrocoeli small and shallow; sternites not particularly strongly sclerotized, plica including at least the 4th sternite; all tergites with broad, apical yellow bands. 11. *Setanta* Cameron
- Gastrocoeli fairly large and deep; sternites strongly sclerotized, at the most the 3rd with plica; abdomen never white or yellow marked. 14. *Ctenichneumon* Thomson
8. Mandibles unidentate, apically pointed; carinae dentiparae exteriores indistinct by very coarse, reticulate rugosity 17. *Neodiphyus* Heinrich
- Mandibles with distinct subapical tooth or notch; carinae dentiparae exteriores distinct. 16. *Diphyus* Kriechbaumer
9. Hypopygium short and wide, strongly sclerotized, middle with short projection forming a wide angle; entire apical part of hypopygium densely covered by short bristles. (Mesoscutum densely punctured, opaque). 12. *Netanyacra* Heinrich
- Hypopygium drawn out into a long and narrow, pointed, not particularly strongly sclerotized projection, covered by rather fine pilosity. (Mesoscutum less densely sculptured, somewhat shiny). 10
10. Projection of hypopygium slightly compressed laterally; apex of abdomen appears to be blunted, by the abbreviation of last tergites, the 7th being usually somewhat truncate and transverse; propodeum shorter than in alternative genus, the area superomedia, as a rule, wider than long. 13. *Eutanyacra* Cameron
- Projection of hypopygium flat; apex of abdomen not blunted; propodeum longer than in the alternative genus, the area superomedia, as a rule, somewhat longer than wide or at least as long as wide. 15. *Spilichneumon* Thomson

FEMALES

1. Carination of propodeum almost entirely obsolete; 1st segment of abdomen on the bend between petiole and postpetiole with a distinct elevation. (Postpetiole irregularly rugose punctate, without median field; black, abdomen red with black 1st segment) 19. *Probolus* Wesmael
- Carination of propodeum distinct; 1st segment without elevation on the bend between petiole and postpetiole. ... 2
2. Large species, 22-26 mm long, uniformly black, partially with bluish tinge, and with deeply infuscated wings; postpetiole finely and densely punctured all over; anterior 1/3 of notauli pronounced. 9. *Protopelmus* Heinrich
- Considerably smaller species of quite different color; postpetiole differently

- sculptured; notauli less developed or lacking. 3
3. Mandibles stout and fairly short, with strong apical teeth, separated by a wide gap, the upper somewhat longer than the lower; postpetiole at least laterally and basally, or apically, coarsely punctured, medially often smooth. (Abdomen more elongate and more slender than in alternative genera, except *Ectopimorpha* Viereck) 10. *Tricholabus* Thomson
- Structure of mandibles different, the teeth not separated by a wide and deep gap; postpetiole with aciculate or longitudinally rugose median field. 4
4. Abdomen markedly elongate, very narrow, and gradually slightly compressed toward apex; in the only species recorded from the southeastern states the postpetiole polished and the anterior tergites shiny, with very fine and sparse puncturation. 18. *Ectopimorpha* Viereck
- Abdomen oval or longish oval; postpetiole with aciculate or longitudinally rugose median field. 5
5. Mandibles unidentate, without indication of a subapical tooth or notch; carinae dentiparae exteriores and interiores lamelliformly raised, the former dissolved into a row of short, curved lamellae. (Thorax black, with extremely rich white markings; abdomen with lateral yellow marks on anterior tergites). 17. *Neodiphyus* Heinrich
- Mandibles with subapical tooth or notch; carinae dentiparae normal. . 6
6. Abdomen black, with apical pale yellow bands on all tergites. (Decisive distinguishing character of the genus is the structure of the flagellum of the male). 11. *Setanta* Cameron
- Abdomen differently colored. 7
7. Gastrocoeli comparatively large and deeply impressed (though, with subobsolete thyridia); at the most the 2nd sternite, sometimes none, with plica. (Abdomen vivid red, or black or both colors in combination, never with white markings). 14. *Ctenichneumon* Thomson
- Gastrocoeli small and shallow; plica on sternites more extended; abdomen ferruginous, usually with black bands, or black with white markings. (The decisive characters of the following genera are present in males only in the structure of the hypopygium and flagellum). . 8
8. Mesoscutum and tergites 2 and 3 finely and extremely densely punctured, opaque. (Hypopygium without a stand of stiff bristles on its apical part; basic color ferruginous). 12. *Netanyacra* Heinrich
- Mesoscutum and tergites 2 and 3 less densely punctured and not opaque. . 9
9. Hypopygium usually with a bunch of fringe or bristles on the apical part; propodeum fairly short, with nearly square, often transverse area superomedia. 13. *Eutanyacra* Cameron
- Hypopygium without apical bunch of bristles; propodeum and area superomedia, as a rule, longer. 10
10. Flagellum tending to be short, with abbreviated basal segments; area superomedia tending to be longer than wide and abdomen to be more or less elongate; mandibles usually fairly stout, apically blunted; legs usually relatively short and stout. 15. *Spilichneumon* Thomson
- Flagellum long and slender, with long basal segments; area superomedia, as a rule, shorter; abdomen oval; mandibles slender, usually apically pointed; legs long and slender. 16. *Diphyus* Kriechbaumer

9. Genus *Protopelmus* Heinrich

Protopelmus Heinrich, 1959c:200. Heinrich, 1962:511. Townes and Townes, 1966:251, 322.

Type species: *Trogus atrocaeruleus* Cresson; monobasic.

SYSTEMATICS: This genus clearly belongs to the subtribe Amblytelina as interpreted by Heinrich (1967-1968:648), where it seems to be related to the Palearctic genus *Hepiopelmus* Wesmael. It shares with the latter the relatively distinct thyridia, the not striate median field of postpetiole, the tendency to form an elevated scutellum, and biologically the parasitism on Arctiidae. It differs from *Hepiopelmus* mainly by more strongly sclerotized, not partially membranous sternites, by the much more highly elevated scutellum, presence of distinct notauli on anterior 1/3 of mesoscutum, and by the area superomedia raised above the surrounding part of propodeum.

The type species is a very handsome insect, females being uniformly black, partially with bluish tinge, males distinguished by rich white markings on abdomen and legs.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females moderately long, bristle shaped, very strongly attenuated toward apex, with elongate basal segments, ventrally flattened but not tangibly widened beyond middle, of males likewise slender and attenuated, with slight indication of sub-apical bristle ridges on ventral side beyond middle and with a row of distinct, narrow tyloids.

HEAD: Temple and cheek profiles very strongly narrowed behind eyes and toward mandible base, respectively, with straight outlines; temples and occiput sloping down immediately and very steeply from hind margin of eyes and ocelli, slightly concave, carina occipitalis markedly raised; frons strongly, vertex slightly concave; mandibles normal, the upper tooth a little longer than the lower.

THORAX: Mesoscutum considerably longer than wide, very densely punctured, opaque; anterior 1/3 of notauli very distinct, sternauli barely indicated; lateral lobes of mesoscutum with shallow, longitudinal depression; scutellum very strongly raised above post-scutellum, apically somewhat truncate, with almost vertical apical slope, laterally not carinate, dorsally slightly convex, densely punctured; propodeum short, area posteromedia nearly twice as long as horizontal part medially; carination complete, except costulae and carinae coxales indistinct or lacking; area superomedia somewhat raised above the level of the surrounding parts of the propodeum, distinctly wider than long, narrowed toward apex, with strongly carinate, rounded anterior corners, its anterior transverse carina sometimes curved backward, in which cases the area superomedia has the odd shape of a heart with cut-off lower half; areae dentiparae abbreviated, without projections; spiracles very large, strongly elongate.

LEGS: Moderately slender; coxae III of females densely punctured, without scopa.

WINGS: Nervulus interstitial or slightly postfurcal; areolet pentagonal, though markedly narrowed in front; radius curved at base.

ABDOMEN: Of females amblypygous, oval, tergite 2 wider than medially long, the 3rd about twice as wide as long; postpetiole densely punctured, with fairly distinct

median field; gastrocoeli narrower than their interspace, rather shallow, with narrow, fairly distinct thyridia; tergites 2 and 3 very finely and extremely densely punctured, opaque; sternites normally, but not strongly sclerotized, 1-4 with plica; hypopygium of males short, bluntly triangularly projecting apically.

DISTRIBUTION: Apparently a genus of Neotropical origin, recorded from Brazil (CGH II) northern Argentina (teste C. Porter), and Mexico, expanding its range over the Gulf States from Texas to Florida.

HOSTS: *Ecpantheria* species (Arctiidae).

1. *Protopelmus atrocaeruleus* (Cresson) Plate 1, Map 41

Trogus atrocaeruleus Cresson, 1868:92, female. Morley, 1915:84, female (Mexico: Teapa in Tabasco).

Trogus atrocoeruleus (!) Townes and Townes, 1951:409, female (as unplaced species).

Protopelmus atrocoeruleus (!), Heinrich, 1959c:200, female, male. Heinrich, 1962:511-512, female, male.

Protopelmus atrocaeruleus, Townes and Townes, 1966:251, 322 (quotations until 1959).

Holotype: female, Louisiana; Lost. Neotype: female, Florida, Ft. Pierce; USNM (designated by Heinrich 1959c). Neallotype: male, Texas, Victoria; USNM (designated by Heinrich 1959c).

SYSTEMATICS: One of the largest and most striking species of Florida. The uniformly blue-black females can easily be mistaken in the field for big spider wasps, and I have, indeed, been deceived in almost every case I caught one. The deception is perfected by the behavior of these females, which, in contrast to all other Ichneumoninae known to me so far, jerk the wings while moving ahead on the surface of leaves. Males are strikingly distinguished by extensive white markings on anterior tergites.

FEMALE: Length 22-26 mm. Uniformly black, usually (particularly in fresh specimens) with distinct bluish tinge on femora, pleura, propodeum, and mesoscutum, wings strongly and evenly infuscated, with purplish reflex; flagellum uniformly black, flattened ventral part brown.

FLAGELLUM: With 45-46 segments, the 1st about 4 times as long as apically wide, in lateral view the 11th square, none wider than long.

HEAD: Face and clypeus coarsely and rather densely punctured, median field of face short, about as long as wide, forming a moderately protruding hump; cheeks also fairly densely punctured; frons coarsely and densely punctured, and obliquely transversely rugose.

THORAX: All pleura densely and coarsely punctured, except usually a small smooth spot on area of speculum, lower part of propleura longitudinally rugose, more than lower 1/2 of mesopleura very coarsely, irregularly longitudinally rugose punctate; upper anterior region of mesopleura markedly swollen. Black, with more or less distinct metallic-blue tinge, particularly on pleura and propodeum.

ABDOMEN: Apical margin of the 6th tergite narrowly, of the 7th more broadly membranous; hypopygium covered by a fairly dense stand of hair; ovipositor hidden.

MALE: Length 20-24 mm. Black, with distinct metallic-blue tinge, richly marked with white (table 5), particularly on abdomen and legs; the following white: entire face, frontal orbits along antennal cavities, clypeus (usually except partially black apical margin), tegulae, subalarum, scutellum, postscutellum, areae spiraculiferae beyond spiracles, often marks on pronotal base and/or collare, large lateral marks on tergites 1-3 (often medially confluent on tergites 1 and 2), longitudinal bands along lateral edges of 4th tergite, usually femora I and II on anterior side more or less extensively (except basal part) tibiae I nearly entirely (except extreme apex on ventral side), tibiae II (except extreme base and the apex on posterior side), tibiae III on exterior and ventral side, except apex (the white on basal 1/2 of tibiae III extending also onto dorsal side), and usually all segments of tarsi I and II basally (sometimes the 5th, rarely the 4th and 5th segments entirely black); flagellum black, without annulus, about 15 basal segments ventrally brownish at apex and very narrowly (often nearly whitish) also at bases; scape more or less extensively, sometimes barely, white marked ventrally on inner side.

FLAGELLUM: With 43-45 segments and with very distinct, elongate tyloids on segments 9 (rarely 8) to 18 (rarely 17), the longest, on segments 12-14, nearly reaching to bases and apices of segments.

HEAD: Malar space barely more than 1/2 as long as width of mandible base.

THORAX: Propodeum somewhat more abbreviated than in female, area supero-media often more than twice as wide as long.

Table 5. Distribution of white on 17 males of *Protopelmus atrocaeruleus* (Cresson) from Florida

No. specimens	Distribution of white
17	face entirely
17	clypeus, except narrow, more or less extensive apical black band
9	collare more or less restrictedly
6	pronotal base more or less extensively (at epomia)
3	pronotal base with minute mark only (at epomia)
17	tegulae
17	subalarum
17	scutellum
17	postscutellum
7	broad apical band on postpetiole
10	apical band on postpetiole medially interrupted or reduced to 2 apical marks
5	2nd tergite except narrow black base and longitudinal median black band
12	lateral marks on 2nd tergite medially partially or entirely confluent
15	large lateral marks on 3rd tergite
2	lateral marks on 3rd tergite medially confluent or almost so
17	longitudinal lateral bands on sides of 4th tergite
17	areae spiraculiferae beyond spiracles partially or entirely
1	pronotal ridge apically
13	anterior side of femora I more or less extensively
4	only extreme apex of femora I more or less extensively
5	anterior side of femora II only with apical white dot or entirely black
17	tibiae I except extreme apex below and tibiae II except apex on posterior side

(continued next page)

Table 5 continued
No. specimens Distribution of white

17	tibiae III on outer side except apex and extreme base
17	tarsi I and II except apices of segments, sometimes except 5th, or 4th and 5th segments

DISTRIBUTION (map 41): Florida, west to Louisiana and Texas; Mexico and Brazil (CGH II). **FLORIDA.** Alachua Co.: 1 female, Gainesville, 31-V-1958, H. V. Weems, Jr. (CHT). Dade Co.: 1 female, 1 male, Matheson Hammock, 25-31-III-1966 (FSCA); 1 female, Ross and Castello Hammock, 17-IV-1959 (FSCA). Highlands Co.: Archbold Biological Station, 1 female, 9-VI-1967, 1 male, 5-IV-1968, G. Heinrich (CGH II); Highlands Hammock State Park, 1 female, 28-IV-1968, 1 female, 2-VIII-1969, G. Heinrich (CGH II). Lee Co.: 18 females, 16 males, Ft. Myers, collected from February to December, D. Radtke (CGH II). Marion Co.: 1 female, Belleview, 6-VII-1972, D. Radtke (CGH II). Palm Beach Co.: 1 male, Belleglade (nr. Lake Okeechobee), 6-IX-1972 (FSCA). St. Lucie Co.: 1 female, Ft. Pierce, 20-V-1957, ex *Ecpanttheria deflorata* (F.) (= *scribonia* (Stoll)), (USNM). Volusia Co.: 1 female, Daytona Beach, 17-XI-1972, D. Radtke (CGH II). **GEORGIA.** Monroe Co.: Forsyth, 1 male, 12-15-VI-1970 (F. Naumann), 1 male, 29-VII-

1970 (G. Heinrich) (CGH II). **LOUISIANA.** Evangeline Co.: 1 male, Bayou Chicot, 6-VI-1971, G. Heinrich (CGH II).

HOSTS: Arctiidae: *Ecpanttheria scribonia* (Stoll) in Florida; *E. muzina* Oberth. in Texas.

10. Genus *Tricholabus* Thomson

Tricholabus Thomson, 1894:2103, 2113. Townes and Townes 1951:296 (5 species from North America). Heinrich, 1961:387-389 (treatment of genus and 6 species from North America). Townes et al., 1965:427 (*Epiopelmidea* Viereck as synonym; 1 species with 3 subspecies from Eastern Palearctic Zone). Townes and Townes, 1966:254 (7 species from Mexico, Brazil, and Paraguay). Heinrich, 1971:982 (biology).

Type species: *Tricholabus femoralis* Thomson; designated by Viereck, 1914.

Epiopelmidea Viereck, 1913:374.

Type species: *Epiopelmidea erythrogastra* Viereck; original designation.

Otohimea Uchida, 1926:146.

Type species: *Otohimea nigra* Uchida; original designation.

SYSTEMATICS: A very distinct and, in both sexes, very clearly defined genus; distinguished particularly by the slender shape of abdomen of females, by structure of mandibles, clypeus, and propodeum in both sexes, and by the peculiar structure of hypopygium and flagellum of males.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped and slender, with elongate basal segments, not or barely widened beyond middle, extremely attenuated at apex; of males markedly nodose, with very distinct, transverse, subapical bristle ridges on ventral side, and without tyloids.

HEAD: Temple profile barely narrowed behind eyes, strongly curved; occiput deeply emarginate; cheek profile slightly narrowed toward mandibles, nearly straight; cheeks in lateral view, very wide and strongly convex; malar space as a rule shorter than the width of mandible base; sides of clypeus very slightly prominent and converging toward apex, the apical margin not completely straight, a trifle emarginate; mandibles rather stout and short, with strong apical teeth, separated by a wide gap, the upper tooth somewhat longer and narrower than the lower.

THORAX: Mesoscutum moderately convex, longer than medially wide; notauli weakly



Map 41. *Protopelmus atrocaeruleus* (Cresson)

indicated at base only; scutellum moderately raised above postscutellum and convex, laterally not carinate; carination of propodeum complete, except indistinct carinae coxales and sometimes costulae; area superomedia approaching the shape of hexagon or Gothic arch, narrowed toward base, often longer than wide; areae dentiparae slanting markedly backward in a gradually rounded slope.

LEGS: Fairly long and slender, femora slim; coxae III of females without scopa.

WINGS: Nervulus distinctly postfurcal; areolet pentagonal; radius slightly sinuate.

ABDOMEN: Of females amblypygous, fairly slender and somewhat elongate; postpetiole in both sexes coarsely and sparsely punctured, the median field medially often impunctate; gastrocoeli comparatively large, fairly deeply impressed, about as long as wide, with distinct thyridia, their interspace usually somewhat narrower than 1 of them; hypopygium of males with approximately triangular, fairly short median projection which is distinctly convex, its lateral and apical borders bending toward ventral surface of abdomen.

CHROMATIC CHARACTERS: Head and thorax usually black, with restricted to considerable white markings; abdomen red, or black, or red with black apical segments, in majority of species with white apical markings, in some species with white marks also on anterior tergites.

Sexual dichromatism considerable in American species where the red color of tergites of females is usually replaced by black in males and the white pattern is usually more extensive in males than in females.

DISTRIBUTION: Holarctic and Neotropical Region.

HOSTS: There has been so far only one host record (Uchida, 1926) for the Palearctic species *strigatorius* Gravenhorst: *Heliothis virescens* (Hufnagel) (Noctuidae). According to recent information received from R. Hinz, this species parasitizes full-grown Cato-pillars of *Euclidia* (= *Euclidimera*, *Catocalinae*).

BIOLOGY: Females do not hibernate; there seems to be only 1 generation per year.

1. *Tricholabus adventicus* (Hopper)

Map 42

Ichneumon adventicus Hopper, 1938:101, male.

Tricholabus adventicus, Heinrich, 1961:393-395, female, male.

Holotype: male, Pennsylvania, Swartmore; ANS. Neallotype: female, North Carolina, Raleigh; CGH II.

SYSTEMATICS: This species is chromatically distinguished by white marks on mesopleura, metapleura, and mesoscutum in both sexes; basic color of abdomen red in females, black in males.

FEMALE: Length 11-14 mm. Head and thorax black, with rich white markings; the following white: frontal, vertical, and sometimes temple orbits (the white band strongly widened on upper frons, strongly narrowed or absent on temples), at least upper part, sometimes whole length, of outer orbits narrowly, upper part of facial orbits (this short band usually separated from the margin of eye by a very narrow black space), and mark on base of mandibles, scutella, 2 short median lines on mesoscutum, large marks on mesopleura and metapleura, collare, pronotal ridge, subalarum, mark on apical part of pronotal base, and tegulae; the white mark on metapleura is larger than that on mesopleura and covers most of area metapleuralis; incomplete W-pattern on propodeum, marks on all coxae, and some other marks (described below); abdomen orange-tinged red with pale yellow pattern; postpetiole with apical band, tergites 2 and 3 with latero-apical marks (sometimes medially confluent), the following tergites, or at least the 6th and 7th, with more or less distinct yellowish-white apical margins; legs pale ferruginous, the following black or blackish: basic color of all coxae and trochanters, apex and base of tibiae III narrowly (sometimes entire length of tibiae III blackish infuscated), usually apex of femora III, and the tarsi II and III; all coxae dorsally white marked, coxae III dorsally usually predominantly or entirely white; flagellum with dorsal white annulus on segments 7 or 8 to 14 or 15 or 16.

FLAGELLUM: Not widened beyond middle, with about 45 segments, the 1st nearly 4 times as long as apically wide, in lateral view the 16th approximately square.

THORAX: Area posteromedia slightly shorter than horizontal part medially; area superomedia considerably longer than wide.

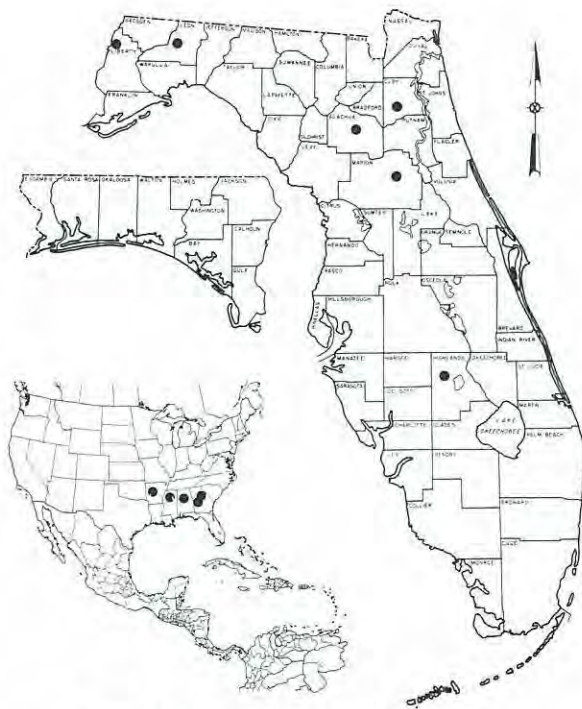
MALE: Length 12-14 mm. Black including abdomen, with very rich white markings; white are: base of mandibles extensively, clypeus and face (except a percurrent longitudinal median black band), orbits

around eyes broadly (interrupted on malar space, narrowed or interrupted on temples, widened on upper part of frons), scutella, 2 short median lines on mesoscutum, large marks on mesopleura and metapleura, more or less incomplete W-pattern on propodeum; all tergites with apical white bands, which are laterally widened on tergites 2-4 and may sometimes be very narrowly interrupted medially on tergites 3 and 4; bands on tergites 6 and 7 laterally more or less abbreviated; legs deep black, including entire femora, tibiae and tarsi III, basic color of femora I and II, ventral side of tibiae I and II, and the tarsi I except most of metatarsus; white are: extensive marks on coxae I and II, entire dorsal side of coxae III, apices and ventral sides (except basal parts) of femora I and II, entire dorsal sides of tibiae I and II, and metatarsus I except apex; flagellum with practically complete white annulus on segments 12 or 13 to 18 or 20; scape ventrally white.

FLAGELLUM: With about 45 segments.

HEAD: Structure as described for the genus; temple profile not narrowed behind eyes; malar space about 1/2 as long as width of mandible base.

THORAX: Black, with white markings as described for the female; sometimes in addition 2 very short lateral white lines on mesoscutum at tegulae.



Map 42. *Tricholabus adventicus* (Hopper)

DISTRIBUTION (map 42): New York and Pennsylvania south to Florida, Georgia, Alabama, Mississippi, and Arkansas. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 11-15-V-1972, G. Heinrich (CGH II). ALABAMA. 1 female, State only (USNM). FLORIDA. Marion Co.: 1 female, 2 males, Ocala National Forest (CNC). Alachua Co.: 1 male, Gainesville, 1-IV-1961 (FSCA). Liberty Co.: 1 female, Torreya State Park, 13-V-1964 (FSCA). Leon Co.: 1 male, Tall Timbers Research Station, 12-VI-1970, G. Heinrich (CGH II). Clay Co.: 1 female, 1 male, Gold Head Branch State Park, 29-IV-1971, G. Heinrich, and 1 male, 3-5-VII-1972, D. Radtke (both CGH II). Highlands Co.: 1 male, Archbold Biological Station, 15-VI-1969, G. Heinrich (CGH II). GEORGIA. Banks Co.: 1 female, Homer, 10-V-1970, G. Heinrich. Monroe Co.: 5 females, 20 males, Forsyth, V-1970-IX-1971, F. Naumann (all in CGH II). MISSISSIPPI. Yalobusha Co.: 1 female, Water Valley, 21-31-X-1971, M. Horan (CGH II).

2. *Tricholabus mitchelli* Heinrich Map 43

Tricholabus mitchelli Heinrich, 1961:395-396, female, male.

Holotype: female, New Jersey, Oceanville; CGH II. Allotype: male, same locality; CGH II.

SYSTEMATICS: Females of this species are chromatically uniquely distinguished by almost uniformly orange-ferruginous head, thorax, abdomen, and legs. In males the entire abdomen is, in contrast to all other eastern species, orange ferruginous (with or without some yellow markings); the basic color of head and thorax of males may, however, be partially to predominantly black. A structural peculiarity of the species is the long propodeum, with the horizontal part distinctly longer than the declivity, and the area superomedia narrow and considerably longer than wide.

FEMALE: Length 12-13 mm. Almost uniformly orange ferruginous; the following yellowish white: scutellum, postscutellum, subalarum, and mark on metapleura; apex of tibiae III and the tarsi III blackish infuscated; flagellum blackish, basally more or less extensively ferruginous or brownish, without, or with reduced white annulus on segments 11 or 12 to 13 or 14, rarely 11-14; scape orange ferruginous.

FLAGELLUM: Not widened beyond middle, extremely attenuated toward apex, with 45-46 segments.

MALE (according to Heinrich, 1961): Length 12-13 mm. Basic color of abdomen always ferruginous; head and thorax ferruginous combined with black, or entirely black or entirely ferruginous, with white pattern of variable extent; apical band on postpetiole and often apico-lateral marks on the following 2-3 tergites pale yellowish; flagellum black, without annulus.

VARIATION: The specimen from western Florida fits into the wide range of variability indicated in the description above for the populations from the Atlantic Coast; it represents, however, an extreme degree of erythrism, combined with reduction of black and of yellowish markings. Black are only: apex of cheeks at mandible base with malar space, basal furrow of scutellum, axillary troughs, areae coxales, the tarsi III, apices of femora III and of tibiae III, apices of coxae III on ventral side, and flagella. Yellowish are: mandibles, sides of clypeus and face, collare, pronotal ridge, subalarum, scutellum, and marks on metapleura. All the rest orange ferruginous.

DISTRIBUTION (map 43): Coastal belt of the Atlantic from Maine south to Georgia and the Gulf Coast of Florida. FLORIDA. Levy Co.: 1 male, 23-III-1959, H. V. Weems, Jr. (FSCA).

ECOLOGY: Apparently ecologically restricted to salt marshes, particularly with

lush growth of *Spartina alterniflora* Loisel (teste R. T. Mitchell).

11. Genus *Setanta* Cameron

Setanta Cameron, 1901:483-484. Morley, 1919:158, 165 (as synonym of *Amblyteles* Wesmael). Heinrich, 1934:166-167 (treatment of the genus; differences from *Amblyteles* Wesmael; fig. of propodeal carination). Townes, et al., 1961:385 (2 species from India, 1 from Formosa, 1 from Celebes). Townes and Townes, 1966:266, 322-323 (10 species, mostly from Mexico and Central America).

Type species: *Setanta rufipes* Cameron; monobasic.

SYSTEMATICS: This genus is very closely related to *Diphyus* Kriechbaumer and *Eutanyacra* Cameron. Only the males are clearly and indubitably distinguished from these 2 genera in structure, differing from *Diphyus* as well as from *Eutanyacra* by the presence of distinct transverse bristle ridges on ventral side of flagellar segments, and from *Eutanyacra* in addition by the bluntly triangular hypopygium, which is not drawn out into a long pointed projection.

Females, particularly the type species and most of the Oriental forms, share with *Eutanyacra* the slightly compressed apex of abdomen and the blunt apical tooth of mandibles; they are practically indistinguishable in morphology from that genus, except that the basal segments of the flagellum are somewhat more slender and more elongate in *Setanta*. There also are no tangible structural differences from *Diphyus*. Females of the Nearctic form differ slightly from the Oriental ones in the shape of the abdomen, which is apically not in the least compressed, but they share with most of them the chromatic pattern: a black abdomen with all or nearly all tergites apically white or yellow banded. A secure placement of a species in the genus *Setanta* will, in any case, need confirmation by examination of the flagellum of the associated male.

Townes and Townes, (1966:323) distinguishes the females of *Setanta* and *Diphyus* primarily by differences in the carination of the propodeum and secondly by the density of puncturation of the 2nd and 3rd tergite. I compared the type of *Diphyus* (*tricolor* Kriechbaumer) with the type of *Setanta* (*rufipes* Cameron) and also with a number of other Himalayan and Indonesian *Setanta* species. The given differences (Townes and Townes, 1966) are fairly clearly developed in the 2 type species, but are not evident in all species. *Setanta malinensis* Heinrich (from



Map 43. *Tricholabus mitchelli* Heinrich

Celebes) for example, displays on the 3rd tergite even a more sparse puncturation than *Diphyus tricolor* instead of a more dense puncturation. The differences are helpful in most cases, but I doubt that they can be used as reliable, distinctive generic characters for the females of the 2 genera.

Credit for the discovery that the North American species *compta* Say, treated below, should be placed in the genus *Setanta* belongs to Henry Townes.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle-shaped, long and slender, strongly attenuated and pointed toward apex, ventrally flattened but not, or little widened beyond middle, the basal segments elongate, about 4-6 times as long as apically wide; of males with transverse bristle ridges on ventral side of segments and with a long row of approximately bacilliform tyloids beginning on about the 5th or 6th segment.

HEAD: Occiput moderately steeply slanting downward from ocelli and temples; temple profile moderately narrowed behind eyes, somewhat curved; cheek profile in typical Oriental species only slightly narrowed toward mandibles and slightly curved, in Nearctic species more strongly narrowed and straight; mandibles in Nearctic species in both sexes normal, with distinct though small subapical, and considerably longer, pointed apical tooth, in females of type species and of most (though not all) Oriental forms apically blunted, with only a faint indication of a subapical tooth; upper frons in Oriental species not, or barely, in Nearctic distinctly concave.

THORAX: Mesoscutum in Nearctic species less convex than in all Oriental species, more coarsely and densely punctured and less shiny, with notauli obsolete (basally indicated in Oriental species); scutellum more or less raised above postscutellum, dorsally barely convex, laterally not carinate; carination of propodeum distinct and almost complete, only costulae and carinae coxales sometimes (as also in Nearctic species) lacking or indistinct; area posteromedial longer than horizontal part of propodeum medially, the area superomedial square or somewhat longer than wide; propodeum and mesopleura coarsely and densely punctate and rugose punctate, only the lower part of speculum nearly smooth.

LEGS: Moderately long; coxae III without scopa.

WINGS: Nervulus postfurcal and oblique; areolet clearly pentagonal; radius slightly sinuate.

ABDOMEN: Of typical Oriental females fairly short, slightly compressed toward apex and not completely amblypygous, as the hypopygium does not cover the slit of the ovipositor to the very end; in females of the Nearctic species slightly more elongate, not compressed toward apex, almost completely amblypygous; petiole gradually widening into postpetiole, the median field of the latter more clearly defined in the Nearctic species than in the Oriental and more regularly aciculate; gastrocoeli distinct though small and shallow, their interspace aciculate or longitudinally rugose; thyridia indistinct or lacking; tergites 2 and 3 more or less densely punctured, in Nearctic species very densely punctate and rugose punctate and also the 4th tergite distinctly and fairly densely punctured.

CHROMATIC CHARACTERS: In the continental Asiatic species as well as in the Nearctic 1, the basic color of body is black, all tergites with white or yellow apical bands, those on tergites 1-3 in Oriental species sometimes medially interrupted and transformed into lateral marks; in the majority of species mesoscutum with yellow or white longitudinal median lines, and propodeum also with so colored markings; in males of Nearctic species yellow on anterior tergites usually expanded over most of the surface, reducing the black to basal marks or bands.

DISTRIBUTION: Mainly Oriental Region: India, Burma, Java, Formosa, Celebes; also Central and (1 species) North America. According to information received from C. Porter, several species in Northwestern Argentina.

1a. *Setanta compta compta* (Say)

Map 44

Ichneumon comptus Say, 1836:229, female, male.

Ichneumon atrifrons Cressons, 1864:157, female.

Pseudamblyteles comptus, Townes and Townes, 1951:292-293, female, male (partim). Heinrich, 1961:203-204, female, male (partim).

Holotypes: *Ichneumon comptus*, male, "United States;" lost. *Ichneumon atrifrons*, female, Illinois (ANS). Neotype: *Ichneumon comptus*, male, Lake Mohonk, New Paltz, New York, 25-VI-1966, FSCA (present designation).

SYSTEMATICS: This species is divided into 2 chromatically well distinguished subspecies, the nominate form occupying the southern and greater part of the range of distribution, the subspecies *marginata* Provancher the northern and smaller part.

An extensively yellow-marked species, with apical yellow bands on all tergites in both sexes; females with all femora orange, males usually with black femora III in northern populations.

FEMALE: Length 12-14 mm. Basic color of head, thorax, and abdomen black, with very extensive yellow markings; differing from the northeastern subspecies, *marginata* Provancher as follows: mesoscutum almost always with 2 longitudinal, narrow, median, yellow stripes; mesopleura with 1 or 2 yellow marks, or with a continuous, broad, diagonal yellow band; apical part of metapleura, areae posteroexternae, and usually areae spiraculiferae extensively or entirely yellow; coxae I and II and all trochanters predominantly to entirely yellow, coxae III extensively to predominantly yellow, ventrally more or less extensively orange; in addition to frontal and vertical orbits usually also a mark on outer orbits and 1 on facial orbits yellow; all tergites with apical and lateral yellow bands, including usually the lateral surfaces of petiole; yellow also are: collare, pronotal ridge broadly, subalarum, scutellum, post-scutellum, and prescutellar carinae; femora, tibiae, and tarsi orange, ventral side of femora and of tibiae I and II more or less distinctly yellow; flagellum black, with complete white, ventrally orange tinged, annulus on segments 6 or (usually) 7-13 or 14; section before annulus ventrally extensively ferruginous, including scape, and with segments on dorsal side apically ferruginous.

FLAGELLUM: With 39-41 segments, the 1st somewhat less than 4 times as long as apically wide, the 13th or 14th approximately square in lateral view, none wider than long.

HEAD: Mandibles with small subapical and markedly longer, pointed apical tooth; cheek profile moderately strongly narrowed toward mandible base, straight; malar space nearly as long as width of mandible base; upper frons concave; temple profile moderately narrowed behind eyes and slightly curved.

THORAX: Mesoscutum longer than medially wide, fairly convex, rather densely and coarsely punctured, subopaque; notauli obsolete; scutellum nearly triangular, somewhat raised above postscutellum, dorsally a trifle convex; area superomedia usually

slightly narrowed toward area basalis, about square or slightly longer than wide; areae dentiparae gradually and considerably narrowed toward apex, elongate, and slanting downward.

ABDOMEN: Not compressed toward apex, elongate oval.

MALE: Length 13-15 mm. Head yellow, the following black: antennal cavities, middle of frons, ocellar region, and occipital region behind the latter (from each side of median black part of occipital region a black band extending to temple margin of eyes), usually a mark on malar space, and entire carina occipitalis; basic color of mesoscutum, mesosternum, and prepectus black, the mesoscutum with yellow markings as in female, sometimes also with longitudinal, laterally yellow stripes; mesosternum often with yellow band along area of sternauli, prepectus sometimes with yellow band or mark on exterior margin; predominantly yellow are: prosternum, pronotum, mesopleura, and propodeum, often including metapleura; legs, including all coxae and trochanters, predominantly pale yellow, the femora III at least dorsally, all tarsi toward apices, and apices of tibiae III orange-tinged, apices of femora III often apically on dorsal side blackish infuscated; coxae III ventrally ferruginous or black; tergites 1-3 yellow with black dorsal side of petiole and black basal marks or bands on tergites 2 and 3; tergites 4-7 black with apical and lateral yellow bands; flagellum black without annulus; scape ventrally yellow.

FLAGELLUM: With 38-41 segments and with distinct, lanceolate, bacilliform tyloids on segments 6 or 7 or 8 to 16, 17, or 18 the longest nearly reaching to bases and apices of segments.

DISTRIBUTION (map 44): From southern New York and Illinois south to northern Florida, Georgia, Mississippi, and Louisiana. FLORIDA. Leon Co.: 3 females, 1 male, Tall Timbers Research Station, 1-17-V-1968, G. Heinrich (CGH II). GEORGIA. Banks Co.: 1 male, Homer, 12-V-1970, G. Heinrich, Monroe Co.: Forsyth, 7 males, 20-30-V-1968, G. Heinrich, 1 male, 23-30-IX-1970, 3 males, 1-30-X-1970, F. Naumann (CGH II). LOUISIANA. Anoyelles Co.: 1 female, Eola, 9-15-V-1972, D. Shaneck (CGH II). Evangeline Co.: 1 female, Bayou Chicot, 16-V-1971, G. Heinrich (CGH II). MISSISSIPPI. Lafayette Co.: 1 female, Oxford (in University Collection, Oxford, Miss.). Oktibbeha Co.: Starkville, 1 male, 11-16-X-1970, 1 male, 14-21-V-1971, C. Sartor (CGH II). Yalobusha Co.: 1 female,



Map 44. *Setanta compta compta* (Say)

Water Valley, 7-VII-1970, G. Heinrich (CGH II). TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 2-VI-1972, G. Heinrich (CGH II).

ECOLOGY: Semi-open country, low vegetation along edges of woodland and wooded ravines.

1b. *Setanta compta marginata* (Provancher), new combination

Amblyteles marginatus Provancher, 1882: 328, female.

Pseudamblyteles comptus, Townes and Townes, 1951:292-293, female, male (partim). Heinrich, 1961:203-204, female, male (partim).

Holotype: female, Quebec; PMQ.

FEMALE: Mesoscutum, sterna, and all pleura uniformly black; yellow on propodeum restricted to areae dentiparae and usually areae superoexternae; pronotal base entirely black, pronotal ridge basally more or less extensively; apical yellow bands on tergites less extensive than in *compta compta*; coxae black, except restricted yellow markings on apex and dorsal side of coxae II and predominantly yellow dorsal side of coxae III; clypeus sometimes with apical ferruginous band or latero-apical marks; otherwise as *compta compta*.

MALE: Propleura, mesopleura, and metapleura black, the latter often, the mesopleura

sometimes with small yellow mark; prosternum black; femora III more or less extensively to predominantly black; tibiae III with black apex; coxae I and II basally more or less extensively, the coxae III ventrally entirely black; otherwise as *compta compta*.

DISTRIBUTION: From Quebec and Maine south to Massachusetts.

12. Genus *Netanyacra* Heinrich

Fig. 25-27

Netanyacra Heinrich, 1968:709-711.

Type species: *Netanyacra nuevoleonis* Heinrich; original designation.

SYSTEMATICS: As in some other genera of the subtribe Amblytelina (*Spilichneumon* Thomson, *Eutanyacra* Cameron) the decisive generic characters of *Netanyacra* are confined to 1 sex, the male, particularly to its hypopygium (fig. 25); the latter is short, unusually wide, and medially somewhat projecting in a wide angle; it is somewhat more strongly sclerotized than usual and (as the preceding 1-2 sternites) covered from side to side by a rather dense stand of bristles (except basally); the claspers are fairly short, rather wide, and strongly convex; this gives the apex of the abdomen of males a characteristic, unusually blunt appearance. Characteristic is also the very densely punctured, subopaque sculpture of mesoscutum and tergites 2-4.

At the time of the description of the genus the associated females were still unknown.

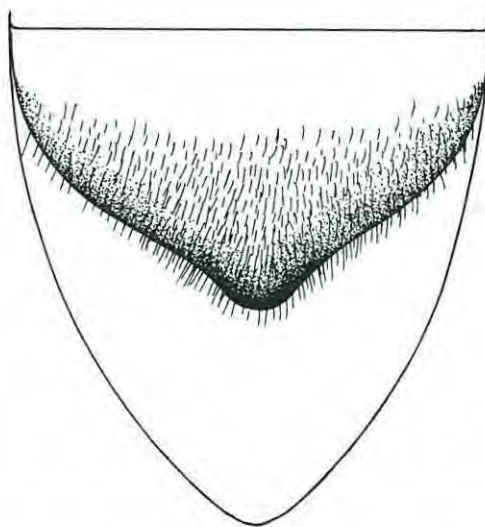


Fig. 25. *Netanyacra leucopus* Heinrich (male). Hypopygium, ventral view.

The 1st female has been collected recently in Georgia. As already mentioned in the original description as a probability, the female is rather similar to *Eutanyacra*; it can be distinguished mainly by the coarsely and extremely densely punctured, subopaque sculpture of the mesoscutum and the dense puncturation of the scutellum; indicative are furthermore the lack of a bunch of fringe or stiff bristles on the apex of hypopygium and the structure of mandibles, which are more delicate and slender than in *Eutanyacra*, 2 distinct apical teeth, the upper fairly short and slender, neither truncate apically or markedly blunted nor sharply pointed (fig. 26).

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of males with a row of long and narrow bacilliform to elongate-oval tyloids which, in contrast to *Eutanyacra*, does not begin before the 4th segment; without transverse bristle ridges on ventral side; of females bristle shaped, long and slender, ventrally flattened beyond middle but barely widened, the basal segments more elongate than in *Eutanyacra*, the 1st segment approximately 3 times as long as apically wide.

HEAD: Temple profile in female more narrowed behind eyes than on the average in *Eutanyacra* but likewise curved; cheek profile also more distinctly narrowed toward mandible base; cheeks in lateral view moderately wide and distinctly convex; malar space in female about as long as width of mandible base, in males barely 1/2 as long; mandibles normal, rather slender, with 2 distinct, delicate apical teeth, the upper apically neither sharply pointed nor markedly blunted; face, frons, vertex, and occiput fairly coarsely and very densely punctured.

THORAX (fig. 27): Mesoscutum somewhat longer than medially wide, distinctly convex, coarsely and extremely densely punctured, subopaque; notauli lacking; scutellum, in

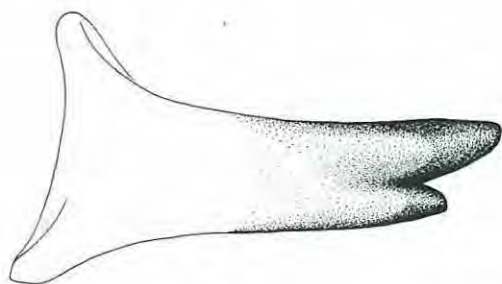


Fig. 26. *Netanyacra leucopus* Heinrich (female). Mandible, frontal view.

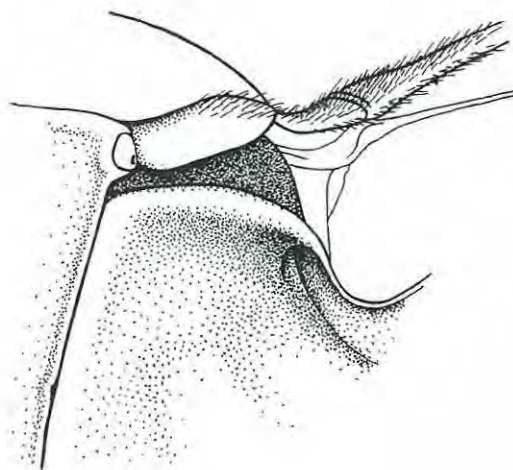


Fig. 27. *Netanyacra leucopus* Heinrich (male). Thorax, lateral view.

both sexes, markedly raised above post-scutellum, more so than in *Eutanyacra*, and more coarsely and densely punctured; area posteromedia in both sexes, though more distinctly in male than in female, longer than horizontal part of propodeum medially; area superomedia large, about as long as wide or (in males) slightly wider than long, usually slightly narrowed toward area posteromedia, with costulae about in the middle; carinae coxales, sometimes also costulae, obsolete; basal furrow distinct, the area basalis steeply declivous from area superomedia.

LEGS: Fairly slender; coxae III of females without scopa.

WINGS: Nervulus postfurcal and oblique; areolet pentagonal; radius slightly curved apically.

ABDOMEN: Of females amblypygous, fairly slender, second tergite about as long medially as apically wide; in both sexes post-petiole with distinct, longitudinally striate median field, the lateral fields coarsely punctured; gastrocoeli only slightly impressed, distinctly narrower than their interspace, approximately quadrangular, longitudinally rugose, with very narrow, indistinct thyridia; interspace of gastrocoeli shortly longitudinally striate-punctate, in males more distinctly than in females; in males all tergites very densely punctured, tergites 2-5 more coarsely than the 6th and 7th, opaque; hypopygium and claspers as described in systematics; in female tergites 2 and 3 coarsely and extremely densely punctured, opaque, the 4th tergite not quite so densely and somewhat finer punctured, extremely finely coriaceous between punc-

tures and slightly shiny except basal part; hypopygium of female with fine and sparse pilosity.

CHROMATIC CHARACTERS: The female displays the type of color so frequently found in Nearctic species of the genera *Eutanyacra*, *Diphyus*, *Spilichneumon*, and *Ichneumon*: ferruginous basic color of the entire body, with some basal black bands on anterior tergites. The sexual dichromatism is considerable and follows the pattern of the above-mentioned genera: abdomen of males black with yellow apical bands on most or all tergites, sometimes most tergites yellow, some with narrow black basal bands; head and propodeum always extensively yellow marked, sometimes also prothorax, mesothorax, and legs.

DISTRIBUTION: South Carolina and South Dakota, south to northern Florida and Arizona; northern Mexico.

1. *Netanyacra leucopus* Heinrich

Fig. 25-27, Map 45

Netanyacra leucopus Heinrich, 1968:712-714, male. Heinrich, 1971:982, female, male (distributional records).

Holotype: male, South Carolina; CHT. Neallotype: female, "Tall Timbers R. S., Tallahassee, Florida, 1-17 May, 1968;" CGH II.

SYSTEMATICS: The original description of this species was based on the male only. The recently discovered female is described below for the first time.

Males are similar in the white pattern to *nuevoleonis* Heinrich (the Mexican type species), but white markings are much more extensive, particularly on legs but also on head and thorax, and the carination of propodeum is considerably more prominent than in the type species. The almost entirely ferruginous females can be distinguished from the various other, likewise ferruginous-colored females of the subtribe Amblytelina by the coarsely and very densely punctured and opaque sculpture of mesoscutum.

FEMALE (neallotype): Length 12 mm. Ferruginous; faintly yellow tinged are: median section of inner orbits narrowly, lateral edges of scutellum, subalarum, and latero-apical parts of postpetiole. The following black: apex of mandibles, base of prosternum narrowly, median area of prepectus, a median, triangular, apical mark on mesosternum, patch on anterior part of median lobe of mesoscutum, trough behind collare narrowly, basal furrow of scutellum, lateral sutures of scutella, and sutures all

around propodeum. Extreme base of petiole and its entire ventral side black; basal black bands on tergites 2-4 not reaching the lateral edges of tergites; flagellum ferruginous, on segments 6-14 a complete white annulus, section beyond annulus black; scape ferruginous.

FLAGELLUM: With 40 segments, the 1st about 3 times as long as apically wide, in lateral view the 18th approximately square, the widest, on the flat side, barely 1.5 times as wide as long.

THORAX: Lateral carinae of area superomedia slightly curved outward and costulae obsolete.

MALE: Length 11-13 mm. Color as detailed below. Table 6.

FLAGELLUM: With 41 (Georgia specimen) segments and with elongate, narrow, approximately bacilliform tyloids on segments 5-19 (apparently constantly), the longest not quite reaching bases and apices of segments. Black, ventrally orange; scape predominantly yellowish white, with longitudinal black band on exterior side.

HEAD: Yellowish white; the following black: malar space, frons and antennal depression broadly, ocellar, occipital and temple regions (the latter except narrowly white temple orbits) with about upper 2/3 of posterior part of cheeks, the yellowish-white band on outer orbits gradually expanding from temples toward mandible base and occupying the entire width of cheeks above mandibles.

THORAX: Black, yellowish white are: collare, pronotal ridge broadly (the band widened at base and at apex of pronotal ridge), pronotal base broadly (the band strongly widened at lower end of pronotal base), bipartite median mark on mesoscutum, prescutellar carinae, scutella, more than lower 1/2 of mesopleura, exterior margin of prosternum, usually a band along lateral edges of prepectus, sometimes also bands or marks along its ventral edges, rarely a small mark on mesosternum along sternauli, subalarum, tegulae, usually short lateral lines on mesoscutum at tegulae, posterior part or all of area superomedia, posterior half of areae spiraculiferae, the areae dentiparae and posteroexternae, a large patch in the middle of metapleura; exceptionally propleura entirely yellowish white.

LEGS: Yellowish white; the following black: always interior side of femora III extensively or entirely, apex of tibiae III, bases of all

coxae and exterior and interior side of coxae III more or less extensively, usually also a longitudinal band on dorso-exterior side of first trochanters III, sometimes ventral side of coxae III extensively, and a mark or longitudinal band on base of posterior side of femora I and II. Tarsi III more or less extensively infuscated.

ABDOMEN: Black; all tergites with broad, percurrent, apical, yellowish-white bands.

Table 6. Distribution of yellow color on 20 males of *Netanyacra leucopus* from Homer, Banks Co., Georgia

No. specimens Distribution of yellow

20	face and clypeus entirely
10	orbits around eyes, interrupted narrowly only on malar space
10	orbits around eyes, interrupted at malar space and also more or less broadly at temples
20	scape, except black band on exterior side and mandibles
20	collare
20	pronotal ridge broadly
20	pronotal base broadly
20	subalarum
20	tegulae
20	scutellum
20	postscutellum
20	prescutellar carinae
19	bipartite median mark on mesoscutum
19	each lobe of prosternum along interior and exterior edge more or less extensively
1	prosternum nearly entirely black
8	band all around prepectus
9	band around prepectus narrowly interrupted at sternauli and at mesolcus as well
3	yellow on prepectus restricted to exterior upper section

No. specimens Distribution of yellow

13	inconspicuous short line on anterior section of sternauli
15	more than lower 1/2 of mesopleura
5	longitudinal band only on lower 1/2 of mesopleura
10	metapleura predominantly
10	metapleura with more or less extensive median mark
4	large mark on each side of propodeum, covering areae dentiparae, posteroexternae, and about apical 1/2 of areae spiraculiferae, but not area superomedia
16	marks on propodeum medially connected through inclusion of area superomedia or part of it
20	apical bands on all tergites
9	legs I and II including coxae entirely or nearly entirely
11	legs I and II except more or less extensive black patch on interior side of femora I and II
19	femora III except black interior side
1	femora III nearly entirely
20	tibiae III except more or less extensively black apex
2	coxae III almost entirely
15	coxae III except more or less extensively black base on ventral side
2	coxae III except nearly black ventral side
1	coxae III except entirely black ventral side
2	trochanters III
18	trochanters III except more or less extensive black mark on inner side



Map 45. *Netanyacra leucopus* Heinrich

DISTRIBUTION (map 45): Ohio and Virginia south to northern Florida, west to Texas. ARKANSAS. Garland Co.: 2 females, Ouachita State Park, 11-22-V-1972, G. Heinrich, D. Shaneck. Pine Co.: 1 male, 12-V-1938, Wm. F. Turner, "from peach by jarring" (USNM). FLORIDA. Leon Co.: 1 female, Tall Timbers Research Station, 1-17-V-1968, G. Heinrich. GEORGIA. Banks Co.: 1 female, 19 males, Homer, 13-20-V-1970, G. Heinrich, R. Duffield. Monroe Co.: 1 female, 4 males, Forsyth, 5-30-V-1968-1971, G. Heinrich, F. Naumann. KANSAS. Riley Co.: 1 male, IX, F. Marlatt (USNM). LOUISIANA. Avoyelles Co.: 1 male, Eola, 23-30-VIII-1972, D. Shaneck. Webster Co.: 1 female, Bistineau State Park, 16-18-IV-1972, G. Heinrich, D. Shaneck. MISSOURI. Boone Co.: 1 male, Columbia, 14-II-1967, Puttler and Thewke, ex *Lacinipolia renigera* (Steph.). Howell Co.: 2 males, 1 female, Willow Springs, 7-V-1966, B. Puttler and 1 male and 1 female, 16-IV-1967 and 15-III-1967 respectively, Puttler and Thewke, all ex *Lacinipolia renigera* (Steph.). (Noctuidae). SOUTH CAROLINA. Greenville Co.: Cleveland, 6-VI-1961, C. F. Townes (CHT). TENNESSEE. Campbell Co.: 2 males, La Follette, 6-VI-1947 (CHT). Henderson Co.: 1 male, 1 female, Natchez Trail State Park, 1-9-VI-1972, G. Heinrich, D. Shaneck. TEXAS. Dallas Co.: 1 male, 1-IV-1907, F. C. Pratt (USNM). VIRGINIA. Montgomery Co.: 1 male, Blacksburg, 28-V-

1938 (no collector name), (USNM). All specimens CGH II unless noted otherwise.

HOST: *Lacinipolia renigera* (Steph.) (Noctuidae).

ECOLOGY: Meadows surrounded by woodland; grassy edges of forests.

13. Genus *Eutanyacra* Cameron

Fig. 28-29

Eutanyacra Cameron, 1903a:227. Heinrich, 1956a:477 (introduction of the genus into taxonomy of North American Ichneumoninae; 1 new species from Arctic Region of Canada). Heinrich, 1961:422-423 (16 Nearctic species). Townes, et al., 1961:386 (3 species from India and Formosa). Heinrich, 1965a:102-105 (4 species from Burma). Townes, et al., 1965:486-488 (3 eastern Palearctic species). Townes and Townes, 1966:267-268 (4 species from Mexico).

Type species: *Eutanyacra pallidicoxis* Cameron.

SYSTEMATICS: As in *Netanyacra* Heinrich, the diagnosis of *Eutanyacra* is based mainly on the male which is distinguished by a long, pointed, median process of the hypopygium (fig. 28), which is not quite flat as in *Spilichneumon* but (in American species) as a rule slightly compressed laterally; males also are characterized by a very long row of tyloids, beginning often on the 2nd or even 1st segment of flagellum.

Females are more difficult to identify and to distinguish from *Netanyacra* and from *Diphyus*; they have a bunch or fringe of long, stiff bristles on the middle of the apical part

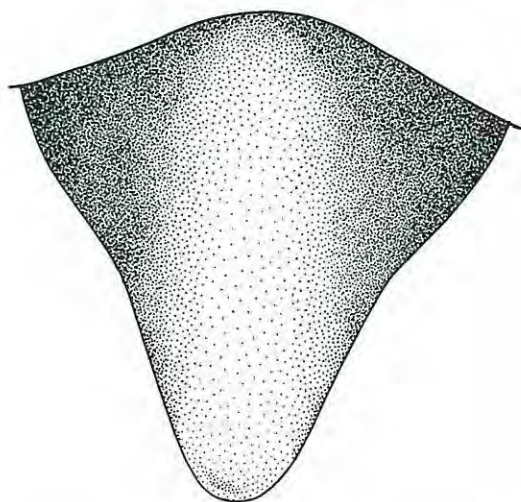


Fig. 28. *Eutanyacra* (male). Hypopygium, ventral view.

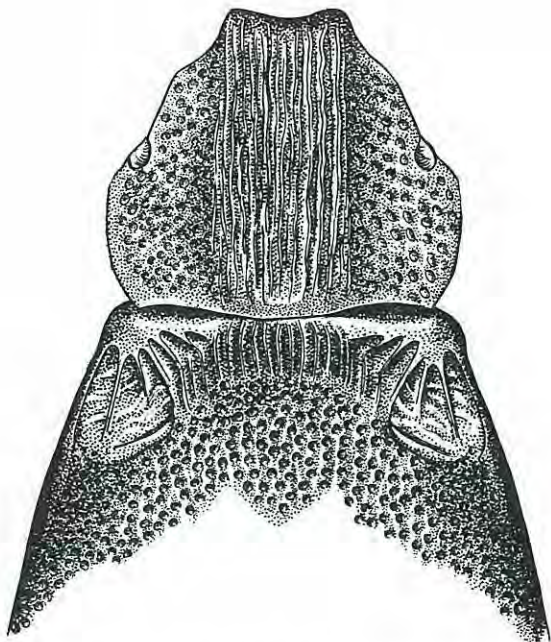


Fig. 29. *Eutanyacra* (male). Basal tergites of abdomen, dorsal view.

of hypopygium, the abdomen is comparatively short, with subquadrate, sometimes transverse area superomedia; furthermore in most of the American species the upper mandible tooth is apically blunted or truncate. The combination of these characters will usually permit a separation from *Diphyus*, *Netanyacra*, and *Spilichneumon*, but the examination of the associated male will always be advisable in order to confirm generic position.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of males with a very long row of elongate, parallel-sided tyloids, which usually begins on the 1st, 2nd, or 3rd segment, forming a practically percurrent ridge; segments without transverse bristle ridges on ventral side; of females bristle shaped, long, and fairly slender, ventrally flattened beyond middle, but not or slightly widened, with usually fairly stout to moderately elongate basal segments.

HEAD: Temple and cheek profiles ranging from moderately narrowed behind eyes and toward mandibles to distinctly inflated; mandibles normal, broader than in *Netanyacra*, in North American females usually the upper tooth more or less blunted.

THORAX: Mesoscutum somewhat longer than medially wide, almost flat to slightly convex, never extremely densely punctured and subopaque; notauli short or obsolete;

scutellum usually slightly raised above postscutellum, in females flat, in males slightly convex dorsally, sparsely punctured and shiny; area posteromedia longer than horizontal part of propodeum medially, the area superomedia usually wider than long, sometimes square; costulae usually indistinct or lacking, carinae coxales usually indicated only or indistinct.

LEGS: Moderately slender to stout; coxae III of females without scopae.

WINGS: Nervulus postfurcal and oblique; areolet pentagonal; radius slightly curved apically.

ABDOMEN: Of females amblypygous, rather stout, usually slightly compressed toward apex, the 2nd tergite usually apically wider than medially long, the 3rd much wider than long; postpetiole with well-defined median field which is, as a rule, longitudinally striate in females, sometimes irregularly rugose, particularly in males (fig. 29); gastrocoeli comparatively small, shallow, with subobsolete or inconspicuous thyridia; hypopygium of females with bunch or fringe of bristles on apical part, of males with long and pointed projection; claspers of males in contrast to *Netanyacra* with somewhat narrowed, slightly elongate and depressed apical part.

CHROMATIC CHARACTERS: In the majority of American species abdomen of female ferruginous, usually with black bands (*succincta* group); in this group a considerable sexual dichromatism is the rule, showing a pattern parallel to the *laetus* group of the genus *Ichneumon*, the abdomen of males being black and yellow banded. In the small *improvisa* group (with 3 species only) the abdomen of females is black, with white apical marks; here the sexual dichromatism is inconspicuous.

DISTRIBUTION: The genus obviously reached its highest speciation in the Nearctic Zone from where its range extends south into Florida and Mexico; a few species are known from the Palearctic and Oriental Regions, absent in Africa south of the Sahara; also not recorded yet from South America.

HOSTS: Noctuidae.

1. *Eutanyacra melanotarsis* Heinrich Map 46

Eutanyacra melanotarsis Heinrich, 1972: 176-177, female, male.

Holotype: female, College Forest, Natchitoches, Louisiana; CGH II. Allotype: male, Natchitoches, Louisiana; CGH II.

SYSTEMATICS: Of the numerous Nearctic *Eutanyacra*, only 2 species are recorded from the Austroriparian Zone of the southeastern states. They share with many other species the basic ferruginous color of the entire body and the black bands of the abdomen. Females, however, are well distinguished from the majority of chromatically similar forms by considerably swollen temples and cheeks; they share this character with *E. validiceps* Heinrich. The species *melanotarsis* appears to be closely related to the latter species and may represent it as the vicarious southeastern form. There are differences, sufficiently important to treat *melanotarsis* as a full species rather than as a subspecies of *validiceps*: (1) all femora are distinctly more slender and comparatively longer; (2) the basal segments of flagellum are longer; (3) tarsi III uniformly deep black (male); (4) wings distinctly infuscated.

FEMALE: Length 12-13 mm. Ferruginous; the following black: base of prepectus, sutures of axillary troughs, basal furrow of scutellum and of propodeum, basal margin of 2nd tergite and/or the gastrocoeli, broad basal band on 3rd tergite, apex of femora III, more than apical 1/3 of tibiae III, and the entire tarsi III; flagellum ferruginous, with complete, though ventrally orange tinged, ivory annulus on segments 6 or 7 to 11 or 12, the apical section from about the 14th segment on black; scape ferruginous.

FLAGELLUM: Long and slender, with 38-39 segments, the 1st 2.5 times as long as apically wide, in lateral view the 6th square, none wider than long.

HEAD: Temple profile and cheek profile not narrowed behind eyes and toward mandible base, respectively, strongly curved; cheeks in lateral view very wide and strongly swollen; malar space somewhat shorter than width of mandible base; upper mandible tooth distinctly blunted; clypeus short and very wide, about 4 times as wide as medially long, flat; median field and lateral fields of face somewhat protruding.

THORAX: Mesoscutum slightly convex, anterior 1/4 of notauli indicated; area superomedia nearly square to considerably wider than long.

LEGS: Moderately slender, long.

MALE: Length 13 mm. Black, in addition to the black markings described for female, are: trough behind collare, almost entire prepectus, mark on posterior end of edge between mesopleura and mesosternum, basal band on 4th tergite, and coxae III ventrally at apex; collare, scutellum, and all

tibiae toward bases yellowish tinged; in contrast to female tarsi III whitish, as are also tarsi I and II; wings less strongly infuscated than in female.

FLAGELLUM: Absent in allotype; in male from Florida with 40 segments and with elongate tyloids on segments 2-22, reaching on about segments 6-15 from bases to apices of segments, being narrow and bacilliform on basal segments and increasing gradually in width from segment to segment, from about 7th segment on to an elongate-oval shape. Pale orange, segments 3-7 dorsally, segments beyond the 15th entirely, black.

NOTE: The male from Florida belongs without doubt to the same species as the type and allotype, but may perhaps represent a different subspecies, as, in contrast to the allotype, face, clypeus, apical part of metapleura, subalarum, and a band on anterior part of mesopleura are pale yellow.

DISTRIBUTION (map 46): FLORIDA. Duval Co.: 1 male, Jacksonville, 22-XII-1967, C. F. Zeiger. LOUISIANA. Evangeline Co., Eola: 1 female, 15-22-VI-1972, D. Shaneck. Natchitoches Co.: 3 females, Natchitoches, College Forest, 11-17-VI-1971, G. Heinrich; 1 male, Natchitoches, 10-V-1965, collector unknown. All specimens in CGH II.

2. *Eutanyacra pycnopus* Heinrich Map 47

Eutanyacra pycnopus Heinrich, 1961:435-436, female, male.



Map 46. *Eutanyacra melanotarsis* Heinrich

Holotype: Female, District of Columbia, Washington; CHT. Allotype: Male, Arkansas, Washington, Co.: USNM.

SYSTEMATICS: A species well distinguished from all others of the genus by very stout legs, with extremely short and thick femora, and by extremely widened temples and cheeks. There is little sexual dimorphism.

FEMALE: Length 12-13 mm. Entire head and the following parts of thorax ferruginous: mesoscutum, collare, pronotal ridge, and tegulae; scutellum and subalarum yellow; rest of thorax black. Legs ferruginous, with the following black parts: coxae, trochanters, entire femora III, and parts of femora II; apex of tibiae III narrowly infuscated. Abdomen ferruginous, tergites 1, 3, and 4 basally more or less infuscated. Flagellum tricolored, with white annulus on segments 5-10 or 11, the base before annulus and the scape ferruginous, the apical section black.

FLAGELLUM: Bristle shaped, fairly short, strongly attenuated toward apex, sharply pointed apically, ventrally flattened beyond middle, but not widened, the first segment fully twice as long as apically wide, the 8th segment square.

HEAD: Temple profile strongly widened behind eyes, curved; cheek profile extremely widened, gradually rounded, in direct front view visible simultaneously on both sides bulging behind eyes for their full length up to vertex; cheeks in lateral view very wide between eyes and carina genalis and scarcely constricted toward the latter. Malar space little more than 1/2 as long as width of mandible base. Upper mandible tooth blunted.

THORAX: Mesoscutum finely and very densely punctured; scutellum somewhat raised above postscutellum, convex. Propodeum fairly short, the horizontal part medially slightly longer than 1/2 of the length of the area posteromedial; area superomedial about as wide as long.

LEGS: Very stout, femora extremely short and thick.

ABDOMEN: Postpetiole finely, longitudinally striate, with some scattered, coarse punctures at apex; gastrocoeli small and superficial; thyridia obsolete.

MALE: Length 12-13 mm. Similar in color to the female, but somewhat more melanistic. Head predominantly ferruginous. Meso-

scutum varying from ferruginous to black; scutellum and subalarum yellow. All tibiae extensively yellow tinged, femora I and II pale ferruginous; otherwise legs colored as in the female. Basal infuscation on segments 1, 3, and 4 usually more extensive than in female, sometimes predominant or replacing the ferruginous color entirely; usually also the 5th tergite basally infuscated. Flagellum pale yellow, with black apex.

FLAGELLUM: With 35-37 segments, and with long, fairly wide tyloids on segments 1 or 2 to 15 or 16, the majority reaching from bases to apices of segments.

THORAX: Nearly as in female.

LEGS: Femora III almost as stout as in female, femora I and II, however, markedly more slender.

DISTRIBUTION (map 47): District of Columbia, Ohio, Ontario, Iowa, Arkansas. ARKANSAS. Washington Co.: 1 male, allotype; 3 males, paratypes (USNM); 1 male, paratype (CGH II).

3. *Eutanyacra succincta* Brullé

Map 48

Ichneumon succinctus Brullé, 1846:301, male. *Ichneumon sandix* Cresson, 1864:174, female. *Pseudamblyteles succinctus*, Townes and Townes, 1951:294, male, female. *Eutanyacra succincta*, Heinrich, 1961:433, male, female.



Map 47. *Eutanyacra pynopus* Heinrich

Holotype: *Ichneumon succinctus*, male, "Bastard, Am. du Nord"; MNHN. *Ichneumon sandix*, female, New York; ANS.

SYSTEMATICS: Distinguished by the rather strongly infuscated wings in both sexes, combined with black basic color of thorax, including mesoscutum in males, and with black sterna and mesopleura in females. Differs from *pynopus* Heinrich by the markedly narrower temple profile, from *melanotarsis* Heinrich by the extensive black color of the thorax in both sexes, and in addition by the ferruginous color of tarsi III in females.

FEMALE: Length 13-14 mm. Head and thorax ferruginous, the latter with the following black parts: propodeum (except base and upper part), mesopleurum (usually except a patch on the anterior part), metapleurum, including the carinal triangle (sometimes except part of area metapleuris), the entire prosternum, mesosternum, and prepectus. Abdomen ferruginous, the 3rd tergite usually with basal black band. Legs ferruginous, the coxae and part of trochanters black. Wings strongly infuscated. Flagellum tricolored: segments 1-5 or 6 ferruginous, the following 6-9 segments yellowish white, the apex fuscous; scape ferruginous.

FLAGELLUM: Bristle shaped, very long attenuated toward apex and sharply pointed, not widened beyond middle; with 42-43 segments, the 1st about twice as long as wide, the 9th or 10th approximately square.

HEAD: Temple profile moderately narrowed, slightly curved; cheek profile moderately narrowed, nearly straight; malar space slightly longer than width of mandible base; upper mandible tooth blunted.

THORAX: Mesoscutum fairly densely punctured, scarcely convex; notauli obsolete; scutellum distinctly raised above post-scutellum, dorsally flat. Area superomedia wider than long, usually narrowed toward apex; costulae sometimes distinct.

LEGS: Moderately long and moderately slender.

ABDOMEN: Median field of postpetiole sharply defined, longitudinally striate. Gastrocoeli distinctly impressed, with narrow thyridia. Second tergite densely and fairly strongly rugosely punctured between gastrocoeli, the 3rd tergite slightly more finely punctured.

MALE: Length 14-16 mm. Head black, the following yellow: mandibles except teeth, face, clypeus, orbits around eyes (always

interrupted at malar space, sometimes narrowly also on vertex, usually ferruginous tinged on vertical and temple regions). Thorax black, scutellum yellow. Abdomen ferruginous, usually with basal black bands on tergites 1-4 or 5; sometimes 1st tergite black except apex; exceptionally abdomen uniformly ferruginous. Legs black, apices of femora narrowly yellowish, interior side of femora I and II more or less extensively so colored; all tibiae and tarsi yellowish. Flagellum black, sometimes ventrally brownish; scape ventrally yellow.

FLAGELLUM: With long, nearly parallel-sided tyloids on segments 2-28 or 31.

THORAX: Scutellum rather strongly convex; area superomedia strongly transverse; costulae distinct.

ABDOMEN: Median projection of hypopygium long, flat, apically rounded.

DISTRIBUTION (map 48): Atlantic to 100° West in Transition and Upper Austral Zones (Townes and Townes, 1951). LOUISIANA. 1 male, recorded by Cresson (1877:174); ANS. I have seen the specimen; the identification is correct.

HOSTS: *Amathes c-nigrum* (L.), (Townes and Townes, 1951).

14. Genus *Ctenichneumon* Thomson

Ctenichneumon Thomson, 1894:2082. Townes and Townes, 1951:295-296 (6 Nearctic



Map 48. *Eutanyacra succincta* Brullé

species). Heinrich, 1961:450-475 (14 Nearctic species). Heinrich, 1965a:98, 99 (5 species from Burma, 1 species from Celebes). Townes, et al., 1965:506:509, 586 (*Neonaenaria* Uchida as synonym; 18 species and 1 subspecies from eastern Palearctic Zone). Townes and Townes, 1966:271 (3 species from Mexico, Argentina and Chile).

Type species: *Ichneumon funereus* Fourcroy; designated by Ashmead, 1900.

Dochyteles Berthoumieu, 1904:50.

Type species: *Ichneumon funereus* Fourcroy; designated by Viereck, 1914.

SYSTEMATICS: One of the most clearly defined and, in both sexes, rather readily identified genera of the tribe. Decisive characters are, in both sexes: (1) the strong sclerotization of sternites with at most the 2nd with a plica; (2) in comparison with other genera of the subtribe Amblytelina, the more deeply impressed gastrocoeli, without distinct thyridia, with usually aciculate interspace. Males are particularly distinguished by structure of the flagellum which is always more or less strongly nodose at least on the apical 1/2.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females always bristle shaped, more or less slender, strongly attenuated at apex, at the most slightly widened beyond middle; of males with distinct tyloids, on the side opposite of that bearing tyloids, with transverse ridges or elevations, which are topped by short bristles (= "bristle ridges"), giving the flagellum a nodose appearance, the more so as the incisions between segments are more pronounced than in related genera.

HEAD: Without distinctive features; temple profile and cheek profile more or less narrowed; mandibles moderately slender, with pointed upper tooth.

THORAX: Mesoscutum distinctly convex; scutellum, on the average, more convex than in *Diphyus*, laterally not carinate; area superomedia in females square or slightly wider than long, in males usually transverse; apex of areae dentiparae never prominent or projecting, the areae dentiparae usually more downward slanting than in *Diphyus*.

LEGS: Moderately slender to moderately stout; coxae III of females never with scopa.

WINGS: Areolet clearly pentagonal, the intercubiti widely separated in front.

ABDOMEN: Postpetiole with clearly defined, aciculate median field; gastrocoeli rather large and deep, but without distinct

thyridia, their interspace usually longitudinally striate; apical tergites more or less smooth and shiny; in both sexes, at the most, the 2nd sternite with plica.

CHROMATIC CHARACTERS: Abdomen red, black, or red and black in combination, without white or yellow markings; thorax and head black, rarely metallic blue, with restricted or without white markings. In a few high mountain species of the Oriental Region general color bright metallic blue, with white marks also on abdomen. Sexual dichromatism rather moderate, except that red abdominal color of the female often can be replaced by black (or blue black) in males.

DISTRIBUTION: Holarctic and Neotropical Regions; high altitudes (2000-3000 m) of the Himalayan chains and the island of Celebes; replaced in the high mountains of Africa, south of the Sahara, by the closely related genus *Ctenichneumonops* Heinrich.

HOSTS: Various genera of Noctuidae have been recorded as hosts of the Palearctic species (*Hadena*, *Parolis*, *Leucania*, *Taeniocampa*, *Cucullia*, *Boloria chariclea* (Schneider), *Trichiura*, *Scutellaria*). There are no host records for any of the Nearctic species.

1. *Ctenichneumon (?) punctiscuta* Heinrich Map 49

Ctenichneumon punctiscuta Heinrich, 1961: 463-464, female.

Holotype: female, Manitoba, Aweme; CNC No. 7257.

SYSTEMATICS: Only 1 of all *Ctenichneumon* species known so far from eastern United States (*semicaeruleus* Cresson) displays the striking chromatic combination of metallic blue head and thorax with red abdomen. The 2 females from Arkansas, treated below, show the same coloration, but differ without doubt specifically by the following characters: (1) temple profile and cheek profile markedly more narrowed behind eyes and toward mandible base, straight; (2) basal segments of flagellum comparatively longer; (3) scutellum not white marked; (4) mesoscutum and scutellum much more densely and coarsely punctured.

Two west Canadian species, also with metallic-blue head and thorax and with red abdomen, *caeruleops* Heinrich and *punctiscuta* Heinrich, agree in characters 1-3 with the females from Arkansas, but only *punctiscuta* shares also character no. 4.

By courtesy of the Canadian Entomology Research Institute, Ottawa, I received the type of *punctiscuta* (female) for comparison

with the females from Arkansas; the latter do not agree completely with the *punctiscuta* type, differing by markedly larger size, strongly transverse (about twice as wide as long) area superomedia, by somewhat coarser puncturation of the 4th tergite, and by a yellow mark on inner orbits level with antennal sockets. All these differences appear too subtle to prove decisively specific distinction, the less so as only 2 specimens from either locality (west Canada and Arkansas) are known. The 2 females from Arkansas, therefore, are treated here tentatively as representatives of the species *punctiscuta*.

In males of *semicaeruleus* and *caeruleops* the abdomen is metallic blue, in contrast to the red abdomen of the associated females. There is a male described from the high mountains of New Mexico, *ruidosensis* Cockerell, with metallic-blue body. It is possible that (a) the females from Arkansas represent a distinct species and (b) that they are associated with the *ruidosensis* male. This problem can be solved only by collecting a series of specimens, containing both sexes, from Arkansas and from the mountains of New Mexico as well.

FEMALE: Length 14 mm. Head and thorax dark metallic blue, except for a small white spot on apex of pronotal ridge and a narrow white band on the middle of inner orbits; abdomen red, except blue-black 1st segment; legs black, tibiae I and tip of femora I ivory on anterior side; extreme base and ventral side of tibiae II and III brownish; flagellum with white annulus on segments 6 to 12 or 13, scape bluish tinged.

FLAGELLUM: With 43-44 segments, the 1st about 2.5 times as long as apically wide, in lateral view the 7th square, the widest on the flat side only slightly wider than long.

HEAD: Temple profile fairly strongly narrowed behind eyes, straight; frons a trifle concave; cheek profile distinctly narrowed toward mandible base, also straight; malar space about as long as the width of mandible base; median field of face somewhat protruding; clypeus basally slightly convex; frons coarsely and very densely rugose punctate.

THORAX: Mesoscutum distinctly longer than wide, fairly strongly convex, the notauli barely indicated at base, coarsely and very densely punctured all over, finely coriaceous between punctures, subopaque; scutellum raised above postscutellum, gradually declivous apically, slightly convex dorsally, coarsely and densely punctured; propodeum

abbreviated, the area superomedia short and about twice as wide as long; carination complete, except costulae indistinct; propodeum coarsely and densely punctured all over, including area superomedia.

ABDOMEN: Gastrocoeli deep, with strong, diverging, longitudinal ribs and with distinct, smooth thyridia, the interspace strongly longitudinally striate; 2nd and 3rd tergite strongly and densely punctured, the 4th and 5th sparsely and finely punctured; plica on sternites 2 and 3.

DISTRIBUTION (map 49): Manitoba, British Columbia, and Arkansas: Garland Co., 2 females, 16-21-V and 24-28-V-1972, G. Heinrich (CGH II).

15. Genus *Spilichneumon* Thomson

Spilichneumon Thomson, 1894:2087. Townes and Townes, 1951:295 (2 species from Nearctic Zone). Heinrich, 1961:180-196 (8 species and 2 questionable from Nearctic Zone). Townes, et al., 1961:389 (1 questionable species from India). Heinrich, 1965a:91-92 (1 species from Burma). Townes, et al., 1965:504 (7 species from Eastern Palearctic Zone).

Type species: *Ichneumon occisor* Fabricius; designated by Ashmead, 1900.

Spiloteles Berthoumieu, 1904:54.

Type species: *Ichneumon occisor* Fabricius; designated by Viereck, 1914.



Map 49. *Ctenichneumon* (?) *punctiscuta* Heinrich

SYSTEMATICS: This genus may be identified by a combination of 2 decisive characters restricted to males: (1) hypopygium tapering into a more or less prolonged, and usually apically pointed, median process; (2) flagellum with a very long row of elongate, bacilliform tyloids on altogether about 15-19 segments, beginning on the 2nd or 3rd, or 4th segment.

Within the Holarctic fauna so far 4 genera of the Amblytelina are known which share character (1) mentioned above: *Spilichneumon*, *Eutanyacra*, *Netanyacra*, and *Triptognathus*. The latter genus, not recorded yet from North America, is readily recognizable by the unidentate mandibles in both sexes. The hypopygium of the *Netanyacra* male has a peculiar structure, rather different from that of *Spilichneumon* and *Eutanyacra* (see treatment of genus *Netanyacra*). Difficult to distinguish are only the males of *Spilichneumon* and *Eutanyacra*; although the hypopygium of the 2 genera show certain structural differences, it will always be necessary to examine the associated female also, in order to secure the generic position of a species.

The most important characters of females of *Spilichneumon*, for the distinction from *Eutanyacra* are: (1) abdomen, as a rule, longish oval, often even elongate, apically not at all compressed; (2) hypopygium without a stand of bristles on apical part; (3) puncturation of tergites, particularly the 2nd and 3rd, finer and sparser, all tergites more smooth and shiny; (4) flagellum stouter, shorter, often with very short basal segments; (5) area superomedia as a rule longer than wide.

The characters for the distinction from *Diphyus* are: mandibles stouter and broader (with the tendency of the teeth to be abbreviated and apically blunted), and also the above characters 3-5.

The use of the combined distinctive characters of males and females will readily identify this genus in the great majority of cases. There are, however, a few species which are intermediate between *Diphyus* and *Spilichneumon* in females; in such cases, I am inclined to consider the structure of the male, in particular the projecting hypopygium and the long row of bacilliform tyloids, as decisive for *Spilichneumon*, even if the generic position of the female seems to be arbitrary.

For a more detailed and comprehensive treatment of the genus see Heinrich, 1961.

CHROMATIC CHARACTERS: Sexual dichromatism is strongly developed and analogous to that of the genus *Ichneumon* Linnaeus. In females the basic color of the abdomen is red, or black, or a combination of both colors, in typical species with apical white marks on posterior tergites (not so in the American *bronteus* group). In males the 1st and last tergites usually are black, some of the anterior tergites yellow or yellow banded.

DISTRIBUTION: Holarctic Region, including the elevations of the Oriental Zone. Lacking in Africa south of the Sahara. Not recorded from South America.

HOSTS: Cryptophagous larvae of Noctuidae, either stem boring (in Europe *Gortyna* and *Nonagria*) or root feeding (in Europe *Leuconycta*). There are no host records for the Nearctic species.

ECOLOGY: Females hibernate in rotten stumps and under moss.

**1a. *Spilichneumon provancheri*
provancheri, Cushman
new combination**

Ichneumon bifasciatus Provancher, 875a:23, 75, female; name preocc.

Amblyteles provancheri Cushman, 1925:388, female; new name. Townes and Townes, 1951:295, female.

Pseudamblyteles provancheri Heinrich, 1961:404-406, female, male.

Holotype: female, Quebec; PMQ (No. 606). Neallotype: male, Dryden, Maine; CGH II.

SYSTEMATICS: A species of arbitrary generic position, females in the structure of mandibles and propodeum approaching the genus *Diphyus*, while the projecting hypopygium of males and their long row of bacilliform tyloids clearly indicate the closest relationship to the genus *Spilichneumon* Thomson, particularly to the species *physcoteloides* Heinrich.

Females of this species are well distinguished in color by black abdomen with broad basal yellow bands on tergites 2 and 3, and with apical white marks on tergites 6 and 7, combined with yellow-banded tibiae. In males the abdomen is black, with basal 1/2 of 2nd tergite and almost the entire 3rd, yellow.

Broad series of males collected in the southeastern states (mainly Georgia) show constantly a considerably greater extent of yellow markings on thorax and legs than specimens from the northeastern type localities. The southeastern populations

therefore, are treated below as distinct subspecies.

FEMALE: Length 13-14 mm. Black; the following yellow: inner orbits up to vertex broadly, collare, pronotal ridge, subalarum, scutellum, usually less than basal 1/2 of 2nd tergite, more than basal 1/2 of 3rd tergite, and all tibiae, except narrowly black bases and broadly black apices of tibiae III and on dorsal side narrowly infuscated bases and more broadly infuscated apices of tibiae I and II; tergites 6 and 7 with white, sometimes not quite distinct, apical marks; all tarsi yellowish orange; flagellum with complete white annulus, on segments 6 or 7 to 12 or 13.

FLAGELLUM: With 41 segments, with fairly short basal segments, 1st only about twice as long as apically wide, the 6th square, scarcely widened on the flat side beyond middle.

HEAD: Temple profile and cheek profile moderately narrowed behind eyes and toward mandible base, nearly straight; malar space slightly longer than width of mandible base; mandibles fairly broad, with subapical tooth well developed.

THORAX: Mesoscutum flat, fairly coarsely and densely punctured, shiny between punctures; notauli faintly indicated at base only; scutellum flat, smooth, with a few scattered punctures; area superomedia usually somewhat longer than wide, nearly parallel sided or slightly narrowed toward apex, with distinct costulae inserted about in, or somewhat before, middle; lateral carinae of area posteromedia more or less indistinct.

LEGS: Moderately stout.

ABDOMEN: Longish oval; median field of postpetiole rather flat and laterally not clearly delimited except basally, very finely, sometimes indistinctly, longitudinally striate, the lateral fields with irregularly scattered punctures; gastrocoeli subobsolete, indicated by a shallow, rather small, almost smooth depression; 2nd tergite finely and sparsely punctured, extremely finely coriaceous between punctures, shiny; 3rd tergite more sparsely and extremely finely punctured, the following tergites smooth and shiny; 4th sternite without plica.

MALE: Length 14-15 mm. Chromatically corresponding with female; propodeum always completely black; head, thorax, and legs more extensively yellow (ivory) marked than in female; the following are ivory: entire face and clypeus, cheeks including malar space up to temple region, frontal orbits broadly up to vertex, mandibles, collare,

pronotal ridge broadly, subalarum, tegulae, lower 1/2 of mesopleura, about exterior 1/2 of mesosternum, apex of prosternum, scutellum, basal 1/2 of 2nd tergite, 3rd tergite except apical narrow black margin; sometimes irregular mark on the disc of 4th tergite, always all tarsi, all trochanters, coxae I and II, tibiae I and II, and tibiae III except broadly black apex, base of femora III narrowly; geographically varying are: mesoscutum from uniformly black to extensively marked with ivory, and the extent of ivory color on femora, sterna, and mesopleura; flagellum black, ventrally pale brown; scape ventrally ivory.

FLAGELLUM: With narrow, bacilliform, elongate tyloids on segments 4-18 or 19, the longest nearly reaching from bases to apices of segments.

HEAD: Malar space about 1/2 as long as width of mandible base.

THORAX: Mesoscutum and scutellum moderately convex; anterior 1/3 of notauli fairly distinct; area superomedia about as wide, or slightly wider than long, with costulae in or behind middle, usually somewhat narrowed toward area basalis.

ABDOMEN: Median field of postpetiole clearly defined and distinctly aciculate; gastrocoeli forming a shallow and narrow, longitudinal depression, the narrow thyridia being removed from the base of the 2nd tergite by a distance of nearly twice their width; hypopygium triangularly, markedly projecting in the middle.

DISTRIBUTION: Quebec and Maine, west to Michigan. Southern limit of range not yet known.

ECOLOGY: Gallery woods along brooks and streams, on grassy patches shaded by trees; meadows surrounded by woodland; also grassy, overgrown, old logging roads through forests.

**1b. *Spilichneumon provancheri*
flavidior, new subspecies
Map 50**

FEMALE: Unknown.

MALE: In addition to ivory markings described for *provancheri provancheri*, the following ivory: often a bipartite median mark and 2 longitudinal median lines on mesoscutum, prosternum almost entirely or entirely, usually entire mesosternum, prepectus predominantly or entirely, mesopleura predominantly, sometimes mark on metapleura, usually pronotal base entirely or predominantly, basal 1/3 or 1/2 of femora III

and their ventral side except apically, sometimes 2 apico-lateral marks on postpetiole, rarely postscutellum. See also table 7.

Table 7. Distribution of yellow color on 20 males of *Spilichneumon provancheri flavidior* from Georgia (14 from Homer, Banks Co., 6 from Forsyth, Monroe Co.)

No. specimens	Distribution of yellow
20	face and clypeus entirely
20	cheeks up to about middle of outer orbits or close to temple region
20	frontal orbits up to vertex
20	scape ventrally
20	mandibles
20	collare
20	pronotal ridge
8	pronotal base more narrowly but for entire length
6	pronotal base with interruptions
4	pronotal base only with small mark at the end
2	pronotal base without yellow markings
20	tegulae
20	subalarum
20	scutellum
9	bipartite median mark on mesoscutum
2	two continuous, longitudinal, narrow lines on notauli
7	two short, longitudinal lines on anterior part of notauli only
9	two short, narrow lines at exterior sides of mesoscutum (near tegulae)
19	prosternum predominantly (except base) to entirely
1	prosternum apically only
13	prepectus predominantly to entirely

No. specimens	Distribution of yellow
5	broad exterior band around prepectus
2	only lateral marks on prepectus
14	mesosternum entirely
6	mesosternum except median part or marks
20	mesopleura up to about middle or more
20	legs I and II entirely, including coxae
20	trochanters III and tarsi III
19	basal 1/3 to half of femora III
1	only narrow base of femora III
17	tibiae III except only black apices
3	tibiae III except also narrowly black base
20	coxae III basally on exterior side
5	coxae III ventrally except about apical 1/3
15	coxae III ventrally except only apical margin, or for entire length
10	coxae III with dorsal longitudinal line or mark
3	latero-apical small marks on postpetiole
20	about basal half or less of 2nd tergite
19	entire 3rd tergite except narrowly black apical margin
1	third tergite except more conspicuous apical black mark

Holotype: Male, Georgia, Monroe Co., Forsyth, 20-30-V-1968, G. Heinrich. Paratypes: 2 males, same data as holotype. GEORGIA. Banks Co.: 3 males, Homer, 13-14-V-1970, G. Heinrich, R. Duffield. All specimens CGH II.

DISTRIBUTION (map 50): In addition to the type material, I have seen the following specimens: ARKANSAS. Garland Co.: 3 males, Ouachita State Park, 15-23-V-1972, G. Heinrich. GEORGIA. 6 males, same data as



Map 50. *Spilichneumon provancheri flavidior*, n. subsp.

holotype except collected 16-24-V-1970. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 3-4-VI-1972, G. Heinrich, D. Shaneck. All specimens CGH II.

16. Genus *Diphyus* Kriechbaumer

Diphyus Kriechbaumer, 1890:184. Townes, et al., 1965:488-496 (40 eastern Palearctic species). Townes and Townes, 1966:268-269 (10 species from Mexico, Costa Rica, Guatemala, and Cuba).

Type species: *Diphyes* (!) *tricolor* Kriechbaumer; monobasic.

Pseudamblyteles Ashmead, 1900:18.

Type species: *Ichneumon palliatorius* Gravenhorst; original designation.

Physcoteles Berthoumieu, 1904:51. Townes and Townes, 1951:292-294 (partim). Heinrich, 1961:307-401 (p. 339 suggestion to synonymize *Pseudamblyteles* with *Diphyus*; 15 eastern Nearctic species). Townes, et al., 1961:386, 467 (3 species from India and Hawaii). Heinrich, 1965a:92-94 (4 species from Burma).

Type species: *Ichneumon palliatorius* Gravenhorst; designated by Viereck, 1914.

Amblyteles, Townes and Townes, 1951:294-295 (partim).

SYSTEMATICS: The summary of the biological notes discussed below fails to reveal common generic characters. But, also

from the morphological point of view the genus *Diphyus* does not appear to be a very clearly defined taxonomic unit. Its only decisive character for the distinction from the closely related genera *Netanyacra* Heinrich, *Eutanyacra* Cameron, and *Spilichneumon* Thomson is confined to the males and represented by their "normal," medially not projecting hypopygium. Females can not be distinguished in structure from *Netanyacra* and only with difficulty from *Eutanyacra*. The borderline between *Diphyus* and *Spilichneumon* is blurred by the existence of intermediate forms; 1 of these is the species *provancheri* Cushman which has been transferred in this paper to the genus *Spilichneumon* on account of the distinctly projecting hypopygium of the male.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, usually rather slender, never strongly widened beyond middle; of males not, or very slightly nodose, as a rule with a fairly short row of 7-10 short-oval tyloids, rarely with a long row of 13-15 elongate, bacilliform tyloids.

HEAD: Temples and cheeks never strongly widened or considerably convex; temple profile and cheek profile more or less, usually rather strongly, narrowed behind eyes and toward mandible base, respectively, often with straight outlines; mandibles moderately slender, the upper tooth usually acute, at the most and rarely, blunted, the subapical tooth usually normally developed, in some American species, however, reduced or even only indicated by a small notch.

THORAX: Mesoscutum distinctly convex, in the type species extremely densely punctured and completely opaque, in all other species moderately densely to sparsely punctured and more or less glossy; scutellum from slightly to moderately convex; area superomedia of the quadrangular type, usually about square, or rectangular, in males usually transverse; areae dentiparae never with tangible apophyses, but, as in the genus *Ichneumon*, sometimes with acute apices.

LEGS: Slender to moderately stout; coxae III of females never with scopa.

ABDOMEN: Of females amblypygous, longish oval in type species, usually short oval; gastrocoeli in both sexes small and only slightly deepened, with obsolete or sub-obsolete thyridia; median field of postpetiole well defined and regularly, longitudinally striate; hypopygium of males as a general rule short and blunt, without median projection.

CHROMATIC CHARACTERS: Basic color of abdomen of females black or ferruginous; in numerous species abdomen yellow banded or ferruginous with black bands, last tergites often with apical white or yellow marks. Sexual dichromatism often is not very pronounced, but usually considerable in the group of ferruginous- and black-banded females, the males of which are usually black and yellow banded (analogous with genus *Ichneumon*).

HOSTS: Only very few host records exist for the North American species. Heinrich (1961) mentions 1 host, *Brachylomia populi* (Strecker), for *Pseudamblyteles populorum* Heinrich from west Canada.

For the Palearctic Region numerous host records have been compiled in the European literature, but many of them obviously are unreliable on account of misidentification of either the parasite or the host, as for example the records for one of the most common species, *palliatorius* Gravenhorst, published by Schmiedeknecht (1928:99) as follows: "*Sphinx pinastri* L., *Smerinthus ocellata* L., *Archeronita atropos* L., *Mamestra tincta* Brahm, *Gnophria rubricollis* L., and *Cucullia verbasci* L."

The only fully reliable Palearctic host records known to me at present are the following given to me by Rolf Hinz: hosts of the *Diphyus* species: *latebricola* Wesmael, *trifasciatus* Gravenhorst, *palliatorius* Gravenhorst, *gradatorius* Thunberg, and (?) *longigena* Thomson are species of the genus (former) *Agrotis* (Noctuidae).

BIOLOGICAL NOTES: Whether all species united at present under the genus *Diphyus* hibernate as adult females is still an open question. In North America females of the species *interstinctus* Cresson, *distinctipes* Cresson, and *flebilis* Cresson have been found repeatedly by Heinrich in hibernation (in rotten stumps). Females of other species, like *amoenipes* Heinrich, *robustus* Cresson, and *ormenus* Cresson have been collected in very early spring, long before the appearance of the associated males, suggesting that these species do hibernate as adults, but a hibernating female has never been found.

Rolf Hinz was kind enough to make available to me his observations pertinent to the hibernation of the European *Diphyus* species. He has found frequently and regularly only 3 species in hibernation: *indocilis* Wesmael, *raptorius* Linnaeus, and *septemguttatus* Gravenhorst. Hinz caught a female of *mercatorius* Fabricius (= *infracratorius* of authors) on the wing during

October, kept it under refrigeration, and had it successfully hibernate; this experiment proves that *mercatorius* is at least physiologically adapted for hibernation, but this species has never been found hibernating in nature.

Bauer collected females of *palliatorius*, and Heinrich a female of *restitutor* so early in the spring that hibernation must be suspected, but again, neither species has ever been found in hibernation.

On the other hand, Hinz stated that females of *subsericans* Gravenhorst oviposit into the growing larvae of the noctuid *Apamea* (formerly *Hadena*); these larvae hibernate full grown and pupate in the spring which indicates that the female of *subsericans* does not hibernate.

Our knowledge of the biology of *Diphyus* is still very incomplete, particularly of their hibernation; without doubt some females hibernate, some do not, some are suspected to hibernate but were never found hibernating; it remains a mystery where the latter hide during the winter.

An interesting observation has to be mentioned: females of the American species *comes* Cresson have been found often in caves by speleologists. A. Seyrig found in Spain numerous *Amblytelina* estivating in caves of the Sierra Nevada.

DISTRIBUTION: Holarctic Region, including higher elevations of the Oriental Region, and Central America. Lacking in Africa south of the Sahara and in Indonesia. Not recorded from South America. No species of this group seem to have invaded the tropical lowlands.

1. *Diphyus comes* Cresson Map 51

Ichneumon comes Cresson, 1864:158, male.

Ichneumon bizonatus Cresson, 1864:160, female; new synonymy. Heinrich, 1961:406-407, female.

Pseudamblyteles comes, Townes and Townes, 1951:292, male.

Diphyus comes, Heinrich, 1969:965-967, male.

Holotypes: *Ichneumon comes*, male, no locality; ANS (No. 946 I). *Ichneumon bizonatus*, female, Colorado; ANS.

SYSTEMATICS: The males share with many other species of the genus the subrudimentary subapical tooth of mandibles and are, in addition, structurally distinguished by: a short, usually somewhat wider

than long, area superomedia, the temple profile slightly curved and only moderately narrowed behind eyes, and by the apically fairly broadly truncate scutellum. Its most distinctive character, however, is the extensive yellow pattern on the propodeum which includes about 1/2 or more of areae spiraculiferae and areae dentiparae, the entire areae posteroexternae, and at least the upper part of area posteromedia.

The male shares this extensive yellow pattern of the propodeum with 1 species of the eastern American fauna only, *flebilis* Cresson. The males of *flebilis* and *comes* are extremely similar indeed; *comes* is, as a rule, more extensively yellow marked on mesoscutum and mesopleura (see treatment below) than *flebilis*, but both species have a wide range of individual variability, and the extent of their yellow pattern overlaps to a certain degree. In direct comparison *comes* has a shorter, usually wider than long area superomedia, slightly wider and more curved temple profile, and apically more broadly truncate scutellum.

In the treatment of *comes* (Heinrich, 1969) I mentioned that this male may perhaps belong to *bizonatus* female as the associated sex. In the Ouachita mountains in Arkansas, during June 1972, *comes* was the only *Diphyus* male to be found and was collected in long series. During the same period and at the same locality only 1 *Diphyus* female was collected, *bizonatus*; this fact strengthens to a high degree of probability the hypothesis that the 2 forms are indeed the associated sexes of the same species and suggests their synonymization. The name *comes* has page priority before *bizonatus*.

The basic color of the entire abdomen of the female from Arkansas is black, exactly as in the holotype from Colorado. In the majority of specimens I have seen from the northeastern states, the basic color of the female abdomen is entirely or partially red. Perhaps 2 subspecies are involved, but males do not seem to offer reliable subspecific differences.

FEMALE: Length 13-15 mm. Black; the following yellow: lateral fields of face, clypeus partially to nearly entirely, frontal orbits up to vertex, collar, apex of pronotal ridge, subalarum, scutellum, and irregular basal bands on 2nd and 3rd tergite; apical tergites without apical marks; legs black including coxae, the tibiae pale yellow, tibiae I and II apically ferruginous, as are all tarsi, the tibiae III apically black; ferruginous are: median field of face, clypeus apically or more extensively, frontal orbits toward vertex; in

eastern populations abdomen shows erythristic tendency, its black basic color usually being partially or entirely replaced by orange ferruginous; flagellum black, with complete white annulus on segments 5 or 6 or 7 to 12 or 13 or 14; scape ventrally yellowish or ferruginous.

FLAGELLUM: Extremely attenuated toward apex, not at all widened beyond middle, with 43-45 segments, the first nearly 3 times as long as apically wide, all longer than wide.

HEAD: Temple profile and cheek profile only slightly narrowed behind eyes and toward mandible base respectively, with slightly curved outlines; malar space nearly as long as width of mandible base; upper mandible tooth comparatively short, the lower rudimentary, indicated by a notch only.

THORAX: Mesoscutum nearly flat; notauli obsolete; scutellum flat; area superomedia square or slightly wider than long.

LEGS: Fairly slender.

ABDOMEN: Longish oval; median field of postpetiole clearly defined, flat, longitudinally striate; gastrocoeli small and shallow; thyridia subobsolete; 2nd tergite fairly strongly and densely punctured, with some longitudinal striation basally in the middle.

MALE: Length 16-19 mm. Black, with very rich pale yellow markings; the following are always yellow: almost entire apical 1/2 of propodeum, mandibles, face, clypeus, frontal orbits, cheeks partially to entirely, collar, pronotal ridge, subalarum, tegulae, scutellum, 2 median marks or longitudinal stripes on mesoscutum, latero-apical marks or apical band on postpetiole, about basal 1/2 of 2nd tergite, entire 3rd tergite, all trochanters, coxae I and II, all tibiae (except apical black 1/3 of tibiae III), femora I and II (dorsally in part orange to blackish infuscated), and all tarsi; in majority of specimens also yellow are: irregular mark to broad longitudinal band on lower 1/2 of mesopleura, pronotal base, postscutellum, coxae III partially to predominantly, and some irregular markings on 4th tergite; exceptionally prescutellar carinae with small yellow marks; malar space with or without black mark; flagellum black, ventrally brownish, scape ventrally ivory.

FLAGELLUM: With 42-46 segments and with elongate, narrowly-elliptic tyloids on segments 7 (sometimes 8) to 18 or 19 or 20.

DISTRIBUTION (map 51): As *comes*: Michigan, New York, Pennsylvania, Dela-



Map 51. *Diphyus comes* Cresson

ware (Townes and Townes, 1951); also Arkansas and Maine (CGH II); as *bizonatus*: Quebec, Ontario, New York, Pennsylvania, Maryland (Townes and Townes, 1951); also Massachusetts and Arkansas (CGH II).

ECOLOGY: Mixed mountain forest in low altitudes. Females have been found repeatedly in caves by speleologists (USNM).

2. *Diphyus? distinctipes* Heinrich Map 52

Pseudamblyteles distinctipes Heinrich, 1961:409-410, female.

Holotype: female, Dryden, Maine; CGH II.

SYSTEMATICS: Among the miscellaneous insects collected over the years by students of the Natchitoches University, I spotted 1 female of a *Diphyus* species, not recorded yet from the southeastern states. This specimen had lost both antennae and therefore cannot be identified with full authenticity, but in all probability represents the species *distinctipes* Heinrich. In discordance with the diagnosis of the latter is only the ferruginous-red (instead of yellow) color of scutellum; this can be due to discoloration, caused by use of cyanide for killing. The record is included in this publication for the sake of completeness.

FEMALE: Length 13-14 mm. Ferruginous, scutellum yellow; the following black: base of

petiole, narrow basal bands on tergites 2-3 or to 4, basal furrow of scutellum and of propodeum, axillary troughs, prosternum and mesosternum, all pleura predominantly to entirely, all coxae, all 1st trochanters extensively, and the femora III apically more or less extensively (only on interior side of tip to apical 1/3, or even 1/2); femora I and II, all tibiae and all tarsi uniformly ferruginous, sometimes tibiae III basally yellowish; flagellum tricolored, scape and segments 1-5 or to 6 ferruginous, 6 or 7 to 13 or 14 white, section behind annulus black.

FLAGELLUM: With 43-44 segments, the 1st more than twice as long as wide, about the 6th or 7th nearly square, none wider than long.

HEAD: Temple profile and cheek profile somewhat narrowed behind eyes and toward mandibles respectively, with outlines curved a trifle only; malar space nearly as long as width of mandible base; mandibles fairly broad, with short apical teeth, the upper not much longer than the lower, which is subrudimentary.

THORAX: Mesoscutum moderately convex, densely and fairly strongly punctured; notauli indicated at the base only; scutellum flat; area superomedia usually somewhat longer than wide, sometimes approximately square, nearly parallel sided, or with slightly bulging lateral carinae.

ABDOMEN: Median field of postpetiole densely aciculate; gastrocoeli small and shallow; tergites 2 and 3 densely and coarsely sculptured, the 3rd somewhat less coarsely than the 2nd, the latter at the base between gastrocoeli longitudinally striate.

DISTRIBUTION (map 52): Quebec and Ontario, south to North Carolina, west to Ohio. The following specimen cannot be identified with certainty: LOUISIANA. Natchitoches Co.: 1 female, Natchitoches, 27-X-1959 (CGH II).

17. Genus *Neodiphyus*, new genus Fig. 30-32

Type species: *Ichneumon flavovarius* Cresson

SYSTEMATICS: The type species belongs clearly to the subtribe Amblytelina and is close to *Diphyus* Kriechbaumer. It is distinguished, in both sexes, by the long (in horizontal level), slightly curved, apically pointed mandibles (fig. 30) without indication of a subapical tooth or notch, and with the lower edge forming a sharp blade. Additional characters, likewise present in

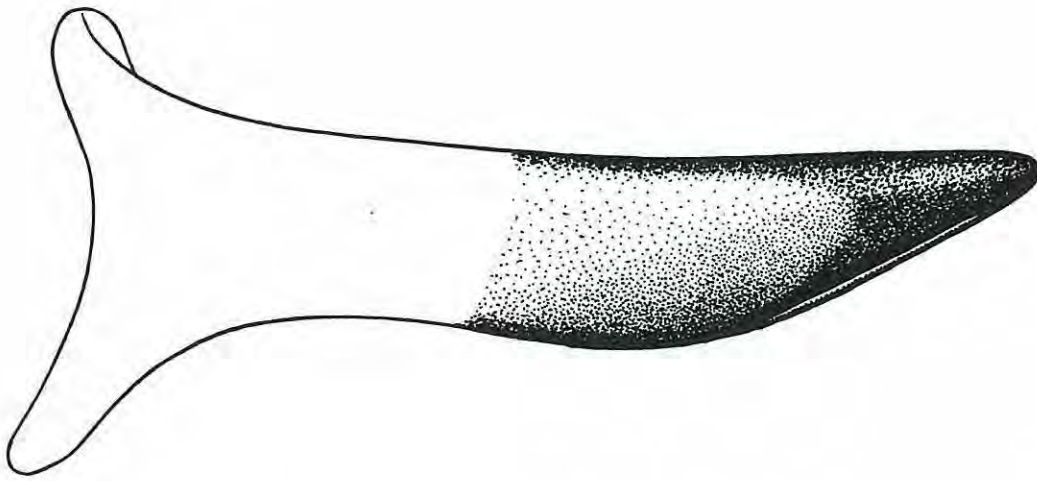


Fig. 30. *Neodiphyus* (male). Mandible, frontal view.

both sexes, are: (1) the lamelliformly raised carinae dentiparae interiors and exteriors, the latter being dissolved into a row of short, curved lamellae, which continue onto the posterior part of areae spiraculiferae, forming a network of very high, irregular rugae; (2) the swollen, evenly convex subalarum (fig. 31). The extremely rich, yellowish-white pattern on head, thorax, coxae, and anterior tergites seems to confirm the neotropical origin of the type species, as well as its generic differentiation from the Holarctic *Diphyus* species. The hypopygium of males (fig. 32) is medially moderately produced in

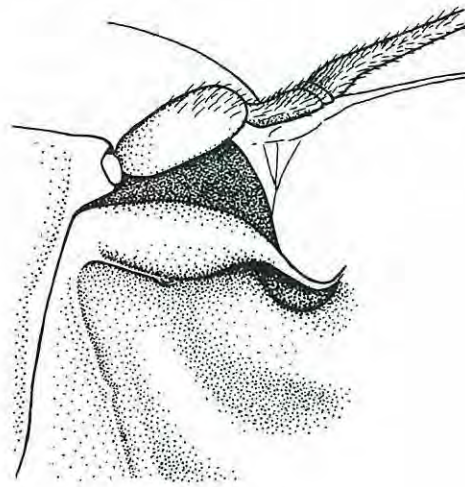


Fig. 31. *Neodiphyus* (male). Thorax, lateral view.



Map 52. *Diphyus distinctipes* Heinrich

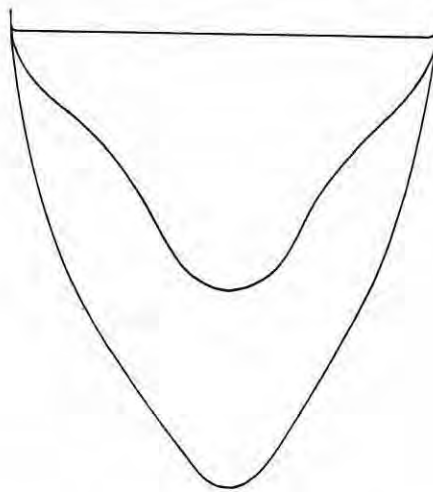


Fig. 32. *Neodiphyus* (male). Hypopygium, ventral view.

the shape of a triangle with narrowly truncate apex.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: As in *Diphyus*: of females slender and bristle shaped, ventrally flattened beyond middle but not widened, apically strongly attenuated; of males likewise long and slender, not in the least nodose, with a long row of normal tyloids.

HEAD: Normal, as in *Diphyus*, with moderately strongly narrowed temple profile and cheek profile; mandibles different from *Diphyus* as described above.

THORAX: Mesoscutum convex, considerably longer than wide, finely and very densely punctured, somewhat shiny; notauli and sternaui obsolete; scutellum of females slightly, of males fairly strongly convex, laterally not carinate; subalarum swollen, evenly convex; general structure of propodeum as in *Diphyus*, the area superomedia in both sexes longer than wide, with roughly rectangular outline; distinguished by an unusual structure and sculpture of carinae dentiparae interiors and exteriors, and of apical part of areae spiraculiferae, as described in systematics; spiracles of propodeum very large.

LEGS: Fairly long and slender; coxae III of females without scopa.

WINGS: Nervulus strongly postfurcal and oblique; areolet pentagonal; radius long and a trifle sinuate.

ABDOMEN: Of females amblypygous, fairly slender; sternites scarcely sclerotized, with pronounced plica, except the last and the penultimate ones; median field of postpetiole barely indicated, in females extremely finely longitudinally rugose, in males more distinctly longitudinally striate, as is in both sexes also the narrow base of 2nd tergite between gastrocoeli; the gastrocoeli superficial, with some irregular longitudinal ribs and without thyridia, in males slightly longer than in females; 2nd tergite finely, the third extremely finely punctured, the former except apico-lateral parts, the latter except about apical third; both tergites with extremely fine, coriaceous undersculpture; in males sculpture of anterior tergites considerably coarser than in females; hypopygium of males as described in systematics.

DISTRIBUTION: Florida and Cuba.

1. *Neodiphyus flavovarius* (Cresson)

Fig. 30-32, Map 53

Ichneumon flavovarius Cresson, 1865a:14, male.

Pseudamblyteles flavovarius, Townes, 1946: 36, male.

Diphyus flavovarius, Townes and Townes, 1966:269, male.

Holotype: male, Cuba; ANS. Neallotype: female, Florida; FSCA.

MALE: Length 16 mm. Head ivory, only middle of frons, ocellar and occipital regions black; thorax ventrally and laterally ivory, the mesoscutum predominantly ferruginous, with 2 continuous, narrow, longitudinal, ivory lines and with a few black marks; the following also ivory: prescutellar carinae, scutellum, postscutellum, and tegulae; propodeum ivory, the following black: basal furrow broadly, area basalis, area superomedia, area posteromedia, about basal 1/2 of areae spiraculiferae; tergites 1-3 black, with broad, apical, ivory bands, the following tergites ferruginous; coxae and trochanters I and II and a large dorsal mark basally on coxae III ivory; anterior side of femora and tibiae I and II predominantly yellow; blackish infuscated are: tibiae III dorsally except base, tarsi III, and dorsal side of coxae III apically; rest of legs ferruginous; flagellum black, ventrally pale ferruginous orange; scape ventrally ivory.

FLAGELLUM: Without transverse, sub-apical bristle ridges on ventral side of segments, hence not at all nodose; with 43 segments, and with elongate-oval, conspicuous tyloids on segments 6-25, the longest, on segments 9-20, covering the entire length of segments, the following tyloids changing gradually in size and shape to very small and bacilliform.

HEAD: Structure, including mandibles, as described for the genus; temple profile slightly narrowed behind eyes, with rather strongly curved outline; malar space fully 1/2 as long as width of mandible base.

THORAX: Propleura except upper part, with fairly coarse longitudinal rugosity; mesopleura and metapleura moderately sparsely punctured, shiny, the speculum smooth. The following black on pleura: narrow, longitudinal median bands on propleura, a narrow, irregular band below subalarum, a short line below speculum; the following black on mesoscutum: space between narrowed posterior parts of longitudinal ivory bands, anterior part of lateral lobes at pronotal ridge, basal furrow and lateral slopes of scutellum.

FEMALE: Length 14-16 mm. Differs from the male in color by slight extension of the

black pattern on pleura, lack of infuscations on dorsal side of tibiae and tarsi (usually also of coxae) III, replacement of black basic color of anterior tergites by dark ferruginous, reduction of apical ivory bands on tergites 1-3 to latero-apical ivory marks on 1st and 2nd tergites, and by presence of white flagellar annulus on segments 7-16; the apical margins of segments before annulus and ventral side of those beyond annulus brown; scape ventrally light ferruginous.

FLAGELLUM: With 44 segments, the 1st not quite 2.5 times as long as apically wide, in lateral view the 7th square, seen on the flat side, the widest about 1.3 times as wide as long.

HEAD: Structure, including unidentate mandibles, as described for the genus; malar space about as long as width of mandible base. Color as in male.

THORAX: Black bands on propleura connected in front, forming a continuous median band on pronotum; black band below subalarum connected with band below speculum and extended in front over exterior belt of prepectus; black on areae spiraculiferae extending almost to their apex. Color otherwise as in male.

LEGS: Dorsal side of coxae III predominantly ivory; tibiae and tarsi III without infuscations, rather pale orange. Otherwise as in male.

DISTRIBUTION (map 53): Cuba, Florida. FLORIDA. Dade Co.: 3 females, Matheson Hammock, 25-III-1957, 11-IV-1959; 1 female, Miami, 16-25-V-1964; 6 males, Ross and Castello Hammock, 30-III-1963. All specimens in FSCA.

18. Genus *Ectopimorpha* Viereck

Ectopimorpha Viereck, 1912b:589. Townes and Townes, 1951:291-292 (5 Nearctic species). Heinrich, 1961:482-495 (10 Nearctic species).

Type species: *Ischnus wilsoni* Cresson; original designation.

SYSTEMATICS: A genus perhaps related to *Limerodops* Heinrich, containing a fair number of species, all of minor size, and distinguished by a peculiar shape of the abdomen of females, which is elongate, narrow, and gradually slightly compressed toward apex. The subobsolete gastrocoeli represent a second generic character. In the type species, the smooth and shiny sculpture of the anterior tergites, with almost obsolete puncturation, offers an additional distinctive character; the latter, is, however, not present



Map 53. *Neodiphyus flavovarius* (Cresson)

in all species now attributed to this genus. Males are usually recognizable by the almost smooth and shiny surface of anterior tergites, including postpetiole, and by the subobsolete gastrocoeli.

The genus can be divided into 2 natural groups of species: (1) the *wilsoni* group, with polished anterior tergites; (2) the *luperinae* group, with alutaceous, opaque or subopaque anterior tergites.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, slender, of moderate length, considerably attenuated toward apex, not at all widened beyond middle; of males with a fairly short row of elongate, narrow tyloids.

HEAD: Of females with scarcely (type species), or moderately narrowed behind eyes, and curved, temple profile; cheek profile more or less distinctly narrowed; mandibles relatively short with 2 normal apical teeth.

THORAX: Mesoscutum slightly convex to almost flat; scutellum dorsally somewhat convex, distinctly raised above postsutellum; carination of propodeum almost complete, including costulae; carina separating area superomedia and basalis often partially obsolete; area superomedia with costulae beyond middle, usually slightly narrowed from costulae toward area basalis.

LEGS: Moderately slender; coxae III without scopa.

ABDOMEN: Of females elongate, narrow, distinctly tapering toward apex, and, at the same time, gradually more and more compressed, strongly amblypygous, ovipositor nevertheless somewhat projecting; petiole gradually widening into postpetiole, the latter in the type species without clearly defined median field, smooth, shiny (in some other species median field of postpetiole longitudinally striate); gastrocoeli subobsolete, indicated only by a very small and superficial impression.

CHROMATIC CHARACTERS: Basic color of the abdomen of females ferruginous, and, as a rule, several tergites with black bands; in the *luperinae* group the apex of abdomen entirely black. Sexual dichromatism considerable only in the type species, the males of *wilsoni* displaying a yellow-banded adomen.

DISTRIBUTION: Nearctic region.

HOSTS: *Luperina stipata* (Morrison), recorded for *Ectopimorpha luperinae* Cushman from Iowa.

1. *Ectopimorpha wilsoni* (Cresson)

Map 54

Ischnus wilsoni Cresson, 1864:188, male.

Ichneumon anceps Cresson, 1867:309, female.

Ectopimorpha wilsoni, Townes and Townes, 1951:292, female, male. Heinrich, 1961:484-486, female, male.

Holotypes: *Ischnus wilsoni*, male, Virginia; ANS. *Ichneumon anceps*, female, Delaware; ANS.

FEMALE: Length 13 mm. Ferruginous, apex of femora III and tibiae III black, scutellum and mark on 7th tergite usually yellow; flagellum blackish, with complete white annulus on segments 8 or 9 to 14 or 15; scape and 1st segment of flagellum ferruginous.

FLAGELLUM: With 39-41 segments, the 1st fully 3 times as long as apically wide, about the 8th nearly as wide as long.

HEAD: Temple profile not, cheek profile moderately, narrowed, both slightly curved; malar space fully as long as width of mandible base; mandibles rather strong, barely tapering toward apex, the upper tooth not sharply pointed, the lower small, but distinct.

THORAX: Mesoscutum convex, very densely punctured, finely coriaceous between punctures, nearly opaque; notauli obsolete; scutellum slightly raised above postscu-

tellum, dorsally slightly convex; carination of propodeum distinct and almost complete, the area superomedia not clearly separated from area basalis, large and almost smooth, with costulae behind middle, gradually narrowed from costulae toward basal furrow; areae dentiparae rather long, markedly slanting downward and narrowed toward apex.

ABDOMEN: Elongate, narrow, gradually tapering and compressed toward apex; hypopygium rather long; ovipositor somewhat projecting; petiole gradually widening into postpetiole, the latter rather narrow, with ill-defined median field, shiny and smooth; gastrocoeli subobsolete; 2nd and following tergites extremely finely and fairly sparsely punctured, polished between punctures, shiny.

MALE: Length 12-13 mm. Black; the following ivory yellow: mandibles except teeth, clypeus, face, frontal and vertical orbits broadly (up to the edge of occipital declivity), apical part of cheeks with malar space, outer orbits from cheeks up to temple region, collare, pronotal ridge more or less extensively, subalarum, tegulae, scutellum, 2nd and 3rd tergites (except medially usually somewhat widened apical black bands), legs I and II including coxae and trochanters, trochanters III, tibiae III except apical 1/3 (which is black); tergites 2 and 3 between the yellow base and black apical bands usually slightly orange tinged; dorsal side of femora I and II usually orange tinged, sometimes partially infuscated; the tarsi III, and tarsi I and II toward apex, pale ferruginous infuscated; flagellum black, ventrally brownish to ferruginous, often with more or less distinct dorsal white annulus; scape ventrally yellow.

FLAGELLUM: With elongate, narrow tyloids on segments 7-17, the longest, on segments 9-11, almost reaching bases and apices of segments.

DISTRIBUTION (map 54): From Maine west to Michigan and Ohio, south to Georgia. GEORGIA. Clarke Co.: Athens, 1 female, V-1969, 1 male, 1-IV-1969, R. Duffield.

19. Genus *Probolus* Wesmael

Probolus Wesmael, 1844:18:150. Berthoumieu, 1896:401. Townes and Townes, 1951: 283 (3 Nearctic species). Heinrich, 1962:518-521 (2 Nearctic species). Townes, et al., 1965:509 (3 eastern Palearctic species).

Type species: *Ichneumon alticola* Gravenhorst (= *culpatorius* Linnaeus); monobasic.



Map 54. *Ectopimorpha wilsoni* (Cresson)

SYSTEMATICS: A small and sharply delimited genus, similar in general appearance to *Ctenichneumon* Thomson, but uniquely distinguished in structure by the following characters: (1) carination of propodeum obsolete; (2) postpetiole without median field, irregularly and coarsely rugose punctate; (3) 1st segment on the bend between petiole and postpetiole with a small, conical elevation.

The genus can be regarded as link between the Eurylabini and Amblytelina, but stands apparently much closer to the latter.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, more or less slender, extremely attenuated and acutely pointed at apex, ventrally flattened beyond middle and sometimes somewhat widened, the flat side without the usual bordering edge on inner side; of males not nodose, with a row of oval tyloids.

HEAD: Temple profile and cheek profile moderately narrowed, slightly curved; clypeus of females slightly convex transversely.

THORAX: Mesoscutum somewhat convex, without notauli, rather sparsely punctured, shiny; carination of propodeum obsolete, but area superomedia faintly indicated by a slight convexity on the horizontal part.

LEGS: Moderately slender; coxae III of females without scopa.

ABDOMEN: See systematics characters (1) and (2); gastrocoeli subobsolete, without thyridia; sternites strongly sclerotized, as in *Ctenichneumon*, the 2nd sternite usually without distinct plica; anterior tergites of female fairly sparsely punctured, shiny, of males rather coarsely and densely punctured, barely shiny.

CHROMATIC CHARACTERS: Color and sexual dichromatism corresponding with the genus *Ctenichneumon*; abdomen of females usually red, except black 1st segment, of males always black.

DISTRIBUTION: Holarctic Zone, including high elevations of the Oriental Zone.

HOSTS: Recorded only for the European type species: *Blepharita adusta* (Esper) and *Aprostola triplasia* (L.) (Berthoumieu, 1896); these records have never been confirmed.

BIOLOGICAL NOTES: Berthoumieu 1896 mentions that females of the type species hibernate, but this statement too, has not been confirmed, as far as I know. I have never found a hibernating female of this genus, neither in Europe nor in North America, nor do my collecting data suggest the fact of hibernation.

1. *Probolus detritus* (Brullé)

Map 55

Ichneumon detritus Brullé, 1846:302, female. Townes, et al., 1961:107.

Ichneumon illaetabilis Cresson, 1877:190, male.

Ctenichneumon (?) *syphax* Townes and Townes, 1951:296, female.

Probolus detritus, Heinrich, 1962:519-520, female, male. (*Ichneumon illaetabilis* as synonym).

Holotypes: *Ichneumon detritus*, female, "Caroline l'herninier," Musée Nat. d'Hist. Nat., Paris. *Ichneumon illaetabilis*, male, Georgia; ANS.

SYSTEMATICS: Females differ from the only other North American species (*expunctus* Cresson) mainly by a more slender flagellum, not widened beyond middle, and with the 1st segment 2 times as long as wide (instead of 1.5 times); males by predominantly rufous (instead of black) legs.

FEMALE: Length 12-15 mm. Black, usually including scutellum, which is sometimes white marked; abdomen red, except 1st segment black; vertical orbits usually with white dot; legs black; flagellum with dorsal white annulus on segments 4 or 5 to 11, or 12, or 13.



Map 55. *Probolus detritus* (Brullé)

FLAGELLUM: With 41-46 segments, the 1st fully twice as long as wide, about the 12th square, none wider than long.

MALE: Length 14-16 mm. Black, including abdomen; scutellum white; legs including coxae and trochanters rufous; tibiae III, sometimes except base, and the tarsi III black; flagellum and scape black.

FLAGELLUM: With 39 or 40 segments, the 1st about twice as long as wide, with short-oval tyloids on segments 8 or 9 to 15 or 16.

DISTRIBUTION (map 55): From Quebec and Ontario, south to Georgia and Louisiana. **GEORGIA.** State only, type locality of *Ichneumon illaetabilis* Cresson. **LOUISIANA.** Natchitoches Co.: Natchitoches, 18-II-1966 (CGH II). **ARKANSAS.** Washington Co.: 10-IV-1953 (USNM).

II. C. Subtribe *Hoplismenina* Heinrich

Hoplismenina Heinrich, 1967-1968:485-486.

Type genus: *Hoplismenus* Gravenhorst; designated by Heinrich 1967-1968:485.

SYSTEMATICS: This subtribe is distinguished by the combination of the following characters: (1) clypeus distinctly convex in longitudinal and in transverse direction, (2) propodeum with considerable apophyses, (3) scutellum extremely raised above postscutellum, but laterally not, or not completely carinate, (4) gastrocoeli not deeply impressed but always recognizable,

with distinct thyridia, (5) areolet pentagonal, the intercubiti widely separated in front, (6) postpetiole more or less distinctly punctured, never longitudinally striate.

By the structure of the clypeus the subtribe approaches the tribe *Platylabini*; the *Hoplismenina* are distinguished from the *Platylabini* by the not widened petiole, the not carinate scutellum, and in most species by the strongly oxygygous abdomen of females.

HOSTS: Exclusively *Rhopalocera*.

20. Genus *Hoplismenus* Gravenhorst

Hoplismenus Gravenhorst, 1829:409. Swift, 1946:397 (revision). Townes and Townes, 1951:283 (7 species and 3 subspecies from Nearctic Zone; genus *Rhysaspis* Tischbein as synonym. Townes, et al., 1961:356-357 (3 species from India, 1 species from Formosa, 1 tentative species from Molucca Is.; *Peritaenius* Foerster, *Zanthojoppa* Cameron and *Taeniaspis* Clément as synonyms). Heinrich, 1962:649-660 (4 species and 4 subspecies from Nearctic Zone; *Rhysaspis* Tischbein and *Peritaenius* Foerster as synonyms). Townes, et al., 1965:483-486 (9 eastern Palearctic species). Townes and Townes, 1966:265-266 (2 species from Mexico, 1 from Guatemala, 1 from Chile).

Type species: (*Hoplismenus maestus* Gravenhorst) = *Ichneumon armatorius* Panzer; designated by Westwood, 1840.

SYSTEMATICS: The diagnosis of this genus has been arbitrary and not definite for a long time as shown by the introduction and synonymization of the many generic names. Recent studies of the forms of *Hoplismenina* of Europe and Asia (Heinrich 1975:445) have convinced me that the synonymizations (Townes and Townes, 1951; Townes, et al., 1961; Heinrich, 1962) of at least the European genus *Rhysaspis* Tischbein and the Oriental genus *Zanthojoppa* Cameron must be revoked. Lack of material did not permit me to reach a definite conclusion about the genus *Taeniaspis* Clément. This leaves *Peritaenius* Foerster as the only undisputed synonym of *Hoplismenus*.

The following diagnosis of the genus *Hoplismenus* is based on its new interpretation, after exclusion of the revalidated or questionable genera mentioned above. This diagnosis includes all North American species.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, long and slender, usually slightly widened beyond middle, long and strongly attenuated toward apex; of males with slight post-

median swellings and faint indication of transverse bristle ridges on inner, ventral side, and with a moderately long row of distinct tyloids on outer side.

HEAD: Temple profile and cheek profile distinctly narrowed behind eyes and toward mandible base respectively, with straight outlines; malar space as a rule markedly longer than width of mandible base; cheeks fairly narrow, not, or slightly convex, receding toward carina genalis; carina genalis percurrent straight to junction with carina oralis, or, at the most, slightly curved outward; clypeus fairly strongly convex in both directions, with straight apical and oblique lateral margins; median field of face somewhat protruding; mandibles rather slender, fairly short, with delicate and short apical teeth, the lower tooth sometimes subrudimentary.

THORAX: Mesoscutum markedly longer than wide, strongly convex; notauli at least basally, sometimes for anterior 1/3, distinct; scutellum considerably raised above postscutellum in both sexes, in females dorsally strongly convex and laterally not at all, or at the most weakly carinate nearly to the middle, apically never carinate, but steeply curved down toward postscutellum; in males scutellum dorsally more or less flattened, sometimes laterally more extensively carinate than in females, apically truncate, the apical transverse edge sometimes forming a low carina (*Peritaenius*); propodeum fairly short, the horizontal part medially about 1/2 as long as area posteromedial; carination clear and complete; area basalis deepened; area superomedial with costulae in, or before, middle, narrowed from costulae toward area basalis, with approximately hexagonal outline; areae dentiparae with conspicuous, upward-curved apophyses; mesoscutum and pleura always very densely punctured, the former opaque or subopaque.

LEGS: Long and slender; coxae III of females without scopa.

WINGS: Nervulus always distinctly postfurcal; areolet always clearly pentagonal, the intercubiti widely separated in front.

ABDOMEN: Of females longish oval, oxygous, the ovipositor distinctly projecting; petiole slender, gradually widened into postpetiole, the latter gradually widened from base to apex, with moderately distinct median field, clearly and more or less densely punctured; gastrocoeli recognizable, but only slightly deepened, with distinct thyridia, the latter much narrower than their interspace,

about as wide as their distance from base of 2nd tergite.

CHROMATIC CHARACTERS: Head and thorax black or ferruginous, with sparse white or yellow markings; abdomen black or ferruginous, or both colors in combination, in American species without white markings. Sexual dichromatism not considerable.

DISTRIBUTION: Holarctic Region and higher elevations of the Oriental Region; also Central America and Chile. Lacking in Africa south of the Sahara.

HOSTS: Nymphalidae.

BIOLOGICAL NOTES: Females of several species have been found repeatedly in hibernation; probably all females hibernate.

1. *Hoplismenus praeruptus* Swift Map 56

Hoplismenus praeruptus Swift, 1946:407, female. Townes and Townes, 1951:283, female. Heinrich, 1962:658, female.

Holotype: female, New York, Ithaca; USNM.

SYSTEMATICS: This species is similar to the more common and more widely distributed *rutilus* Cresson, but is, on the average, smaller and different as follows: (1) scutellum laterally carinate to about middle (in *rutilus* at the base only); (2) puncturation of mesopleura and of mesoscutum much denser; (3) section of flagellum before white annulus completely black (ferruginous in *rutilus*).

FEMALE (specimens from Georgia): Length 9 mm. Light ferruginous; the following ivory: facial and frontal orbits up to vertex, outer orbits narrowly, collare, subalarum, pronotal base narrowly, scutellum, and coxae I ventrally in part; tibiae III apically fairly broadly infuscated; flagellum black, with nearly complete white annulus on segments 6 or 7 to 12, scape ferruginous.

FLAGELLUM: With 38-39 segments, the first fully 4 times as long as apically wide, the 15th nearly as wide as long, none distinctly wider than long.

HEAD: In lateral view eye medially 1.5-1.6 times as wide as cheek; malar space 1.2-1.4 times as long as width of mandible base; carina genalis parallel to posterior margin of eye and straight to junction with carina oralis.

THORAX: Anterior 1/3 of notauli and the sternaui on mesosternum very distinct; mesopleura, including speculum very closely punctured, punctures nowhere separated by their own width, opaque; mesoscutum also



Map 56. *Hoplisenus praeruptus* Swift

very densely punctured, coriaceous between punctures, opaque; scutellum strongly elevated, laterally carinate to about middle.

ABDOMEN: Postpetiole and tergites 2 and 3 densely punctured, the 3rd tergite somewhat finer than the 2nd.

DISTRIBUTION (map 56): Connecticut, New York, Washington and Georgia. GEORGIA. Clarke Co.: 1 female, Athens, 1-VI-1969, G. Heinrich. Monroe Co.: 1 female, Forsyth, 23-V-1970, G. Heinrich. All in CGH II.

II. D. Subtribe Cratichneumonina Heinrich

Cratichneumonina Heinrich, 1967-1968: 791-798

Type genus: *Cratichneumon* Thomson

SYSTEMATICS: The number of forms belonging or related to the type genus is considerable in the entire Holarctic Region (particularly in its Nearctic part) but the subtribe has reached the highest degree of proliferation in the tropical parts of the world.

The Cratichneumonina are the least specialized group of the tribe Ichneumonini, generally characterized by shallow, usually only slightly or barely impressed gastrocoeli, with nearly always recognizable, though usually small thyridia, and by the fine, punctured, coriaceous or alutaceous sculp-

ture of postpetiole and anterior tergites, lacking (with rare exceptions) all aciculation on the postpetiole and (always) on the second tergite. The abdomen of females is oxygygous.

The genus *Virgichneumon*, new genus, with distinct and fairly deep gastrocoeli, stands on the borderline between Ichneumonina and Cratichneumonina. It is included here, together with the entire *Melanichneumon* group, in the Cratichneumonina. *Limonethe* Townes, a genus apparently of Neotropical origin, seems to belong to this subtribe according to general structure and sculpture, but is strikingly distinguished by an areolet which is very different from all Ichneumonini of the Old World and of North America. This may perhaps indicate tribal separation. *Plagiotrypes* Ashmead has been treated at the end of this subtribe, although it certainly does not belong to it; the correct tribal position of this genus still must be investigated.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females, as a rule, filiform, subfiliform or subbristle shaped, and stout to moderately long and moderately slender, less often clearly bristle shaped, exceptionally slender and long. Of males, as a rule, with a short row of bacilliform or longish-oval tyloids and more or less markedly nodose, with or rarely without transverse bristle ridges on ventral side.

HEAD: Temple profile, as a rule, not very strongly narrowed behind eyes, often not narrowed at all, sometimes even widened, usually distinctly curved; malar space never very long, usually shorter than width of mandible base or as long as the latter; clypeus usually normal, flat, with straight apical border, sometimes with an apico-median impression; clypeus in a group of North American males dish shaped, concave, in females of the genus *Paraditremops*, new genus, strongly convex; mandibles normal.

THORAX: Mesoscutum, as a rule, neither very long nor strongly convex; basal part of notauli more often distinct than not, sometimes pronounced; sternauli on the mesosternum also usually indicated or distinct; scutellum flat to slightly raised above postscutellum, laterally usually not, rarely partially and indistinctly carinate; propodeum, as a rule, more or less abbreviated, with the area posteromedia longer than horizontal part medially, particularly in males; apophyses of areae dentiparae usually lacking, rarely indicated or present; area superomedia usually hexagonal, often

longer than wide, with costulae before middle, narrowed from costulae toward area basalis; in a number of species of the genus *Cratichneumon* area superomedia nearly parallel sided and confluent with area basalis, costulae indistinct; in *Melanichneumon* Thomson area superomedia large and arched in front.

LEGS: Short and stout to moderately, never extremely, long; claws never pectinate; coxae III sometimes with scopa.

WINGS: Nervulus postfurcal or interstitial; intercubiti tending to be narrowed in front, areolet thus pentagonal to rhomboidal; radius not markedly sinuate, often short.

ABDOMEN: In females of Nearctic Region oxygygous, with ovipositor not or slightly projecting (strongly projecting only in 1 northern genus, *Crypteffigies* Heinrich); postpetiole, as a rule, punctured in the *Melanichneumon* group, coriaceous, irregularly rugose or alutaceous in *Cratichneumon*, sometimes smooth, exceptionally longitudinally striate; gastrocoeli shallow to obsolete, thyridia, however, as a rule recognizable to very distinct; in the genus *Virgichneumon* gastrocoeli well developed and deepened; sculpture of anterior tergites punctured or coriaceous, sometimes nearly smooth, without aciculation.

Key to genera of *Cratichneumonina* recorded from the southeastern states

1. Mandibles unidentate, sickle shaped; abdomen of females amblypygous. (Abdomen black and yellow banded; propodeum with long apophyses; scutellum laterally strongly carinate; length 11 mm). 34. *Plagiotrypes* Ashmead
- Mandibles not unidentate and not sickle shaped; abdomen of females oxygygous. 2
2. Area superomedia with longitudinal median carina. 3
- Area superomedia without longitudinal median carina. 4
3. Clypeus flat, medially toward apex with distinct, longitudinal impression, its apical margin thin and slightly protruding on each side of impression; propodeum abbreviated, the area posteromedia nearly 3 times as long as the horizontal part medially; area superomedia with only 1 longitudinal median carina; spiracles of propodeum long, slit shaped; areolet with intercubiti almost

coalescent in front. 32. *Carinodes* Hancock

- Clypeus rather strongly convex, without impression, with completely straight apical margin; propodeum not abbreviated but elongate and depressed, the area posteromedia shorter than the horizontal part medially; area superomedia on each side of longitudinal median carina with another, less distinct longitudinal elevation or carina; spiracles of propodeum small, short oval; areolet pentagonal, with intercubiti well separated in front. 33. *Paraditremops*, new genus

4. Areolet approaching a square shape, the intercubiti nearly parallel and thus extremely widely separated in front, the 2nd abscissa of cubitus strongly abbreviated, its length only a fraction of that of the 1st abscissa. (The only species occurring in the southeastern states black, with deeply-infuscated wings and with red abdomen). 31. *Limonethe* Townes

- Areolet normal, either pentagonal or rhomboidal. 5

5. Flagellum of females lanceolate, more or less considerably widened beyond middle and strongly attenuated toward apex; area superomedia large, in females usually half oval, in males abbreviated, widened horseshoe shaped, sometimes halfmoon shaped. (Last tergites usually with apical white marks, in most species combined with lateral white marks or apical bands on anterior tergites). 28. *Melanichneumon* Thomson

- Flagellum of females not lanceolate, ranging from short and filiform to fairly long and bristle shaped, but never strongly widened beyond middle; area superomedia comparatively smaller. 6

6. Thyridia (and gastrocoeli) widened, their interspace much narrower than 1 of them. (Postpetiole punctured or irregularly, finely rugose or coriaceous). .. 7

- Thyridia not widened, their interspace distinctly wider than 1 of them. (Postpetiole punctured, or striate, smooth, or coriaceous). 9

7. Postpetiole neatly and densely punctured. (Small species, 7-8 mm long). 24. *Stenobarichneumon* Heinrich

- Postpetiole not punctured but finely, irregularly coriaceous rugose. 8

8. Thyridia horizontal, approximately parallel to anterior border of 2nd tergite, usually rather poorly defined, particularly in females; mesoscutum, as a rule, shiny and without coriaceous undersculpture between punctures. (Flagellum of females fairly short and usually filiform, rarely attenuated toward apex, as occurs in the only species recorded from the southeastern states).
..... 22. *Homotherus* Foerster
- Thyridia oblique, diverging considerably from anterior border of 2nd tergite toward its exterior sides, always clearly defined; mesoscutum, as a rule, opaque and with dense, coriaceous undersculpture between punctures. (Flagellum of females, as a rule, bristle shaped and fairly long, as occurs in the only species recorded from the southeastern states.)
..... 30. *Aoplus* Tischbein
9. Median field of postpetiole finely sculptured, usually densely coriaceous, or irregularly, finely rugose, or alutaceous. (Last tergite never with apical white mark; only in 1 species (*unifasciatorius* (Say)) median field of postpetiole longitudinally striate and wings of females deeply infuscated; numerous species in the southeastern region).
..... 21. *Cratichneumon* Thomson
- Median field of postpetiole neatly and strongly punctured, or longitudinally striate, or almost smooth, in the latter case usually with a few punctures or striae, but never coriaceous or finely and irregularly coriaceous rugose; last tergite with or without apical white mark.
..... 10
10. Areae dentiparae with more or less markedly projecting apophyses, particularly in males; flagellum of males not nodose, without transverse bristle ridges on ventral side. (Median field of postpetiole longitudinally striate in females, usually nearly smooth in males; area superomedia hexagonal with costulae before middle, often elongate and coffin shaped; basic color of entire body always ferruginous in both sexes, usually with restricted black, but almost without white coloration, except scutellum and face ivory in some males and apical tergites white marked in some females).
..... 27. *Rubicundiella* Heinrich
- Areae dentiparae without tooth-like projections, at the most with sharply pointed apical corners; flagellum of males with distinct, transverse bristle ridges on ventral side. 11
11. Clypeus short and extremely widened, about 5 times as wide as long; mandibles wide and long, with reduced subapical tooth; femora extremely stout 29. *Rictichneumon* Heinrich
- Clypeus, mandibles and femora normal 12
12. Gastrocoeli medium sized, clearly defined, fairly deeply impressed, approximately triangular, with distinct thyridia, sexually not tangibly dimorphic. (Flagellum of females bristle shaped, fairly long, more or less distinctly attenuated toward apex; medium-sized forms, usually about 12 mm long; in type species all tergites with apical yellow bands, in other species abdomen also ivory banded or almost uniformly orange or black). 26. *Virgichneumon*, new genus
- Gastrocoeli very small, often punctiform or obsolete, with small, often indistinct thyridia, sometimes sexually dimorphic. 13
13. Structure of gastrocoeli and thyridia sexually markedly dimorphic: in females the superficial and small gastrocoeli and thyridia are located at the extreme base of 2nd tergite as is usual, in males gastrocoeli narrowed and markedly to considerably elongate along the lateral border of the 2nd tergite, consequently, the thyridia are far removed from the base of that tergite; median field of postpetiole sometimes nearly smooth, tending to be longitudinally striate or rugose, more rarely punctured; flagellum of females, on the average, longer than in the alternative genus, with the 1st segment more than twice as long as apically wide. (Seventh tergite with apical white mark; basic color of abdomen black, or red and black). 25. *Vulgichneumon* Heinrich
- Gastrocoeli very small, often punctiform or indistinct, sexually not markedly dimorphic; median field of postpetiole always densely and neatly punctured; flagellum of females shorter and stouter, with the 1st segment usually less than twice as long as apically wide, usually filiform, sometimes subbristle shaped. (Seventh tergite only rarely with apical white mark; basic color of abdomen in southeastern species orange or ferruginous orange). 23. *Barichneumon* Thomson

21. Genus *Cratichneumon* Thomson

Cratichneumon Thomson, 1893:1945. Townes and Townes, 1951:287-290 (9 Oriental genera of Cameron and 3 Madagascan genera of Heinrich as synonyms; 36 Nearctic species). Heinrich, 1961:98-173 (treatment of genus and of 45 species from Northeastern North America). Townes, et al., 1961:373-375 (7 Oriental genera of Cameron as synonyms; 18 Indo-Australian species). Townes, et al., 1965: 440-447 (30 eastern Palearctic species). Townes and Townes, 1966 (6 species from Mexico and Guatemala).

Type species: *Ichneumon luteiventris* Gravenhorst; designated by Ashmead, 1900.

SYSTEMATICS: The name *Cratichneumon* is applied to in its limitation the taxonomically most problematic and most arbitrary group of this subfamily. The basic question here is, as usual, whether to lump mainly for the sake of convenience, or to split, in an attempt to adjust the system as far as possible to the subtle evidence of evolutionary divergence. I am in favor of the second tendency. Consequently, what Townes and Townes (1951) considered as 1 genus with 12 synonyms, became in my recent interpretation (1967-1968:791) a subtribe, with 38 genera in the Ethiopian Region (36 of these were maintained by Townes and Townes, 1973), none of which seemed to me identical with the Holarctic genus *Cratichneumon* as represented by the type species *luteiventris* (Gravenhorst), and Townes and Townes (1973) have disagreed only to a minor extent in synonymizing the genus *Nimbolareiga* Heinrich with *Cratichneumon*. According to Townes and Townes (1966) no typical representative of the genus *Cratichneumon* (sensu stricto) has been recorded from tropical South America either. I suspect that what seems to be true for Africa and South America may be applied in general also to the 3rd large tropical region of the world, the Oriental Region (or Indo-Australian area), namely that genuine *Cratichneumon* species are absent or very rare, being largely replaced by forms related to it, but sufficiently differentiated to be generically separated. I wonder whether the synonymization of all the 7 Oriental genera of Cameron (Townes and Townes, 1973) is justified, but thorough revision of Cameron's Oriental genera of the subtribe *Cratichneumonina* is a major and time consuming task which I must postpone.

The multitude of Holarctic forms of the genus *Cratichneumon* itself (as interpreted by Townes and Townes, 1951, and likewise by Heinrich, 1961) is obviously also composed of

a number of rather heterogenous elements, all too heterogenous to be called 1 and the same genus. Actually there are only a few species in *Cratichneumon* which morphologically fully agree with the type species *luteiventris* (in Europe only 2 species: *albiscuta* Thomson and *pseudogracilentus* Strobl). The species *nigritarius* (Fabricius), *nivatus* (Gravenhorst), *brevipennis* (Cresson), *unifasciatus* (Say), and *variegatus* (Provancher) (males with "dish-shaped" clypeus), each represent a rather different group. But, there too, an attempt at generic revision must be postponed. In this paper the genus *Cratichneumon*, therefore, is interpreted according to Townes and Townes (1951) and Heinrich (1961).

Cratichneumon is most closely related to some genera of the *Melanichneumon* group, particularly to *Barichneumon* Thomson and *Vulgichneumon* Heinrich. It is distinguished from the latter 2 genera only by finer sculpture of the postpetiole and especially of the 2nd tergite, which are never coarsely and evenly, but at the most finely, punctured, often coriaceous or alutaceous. Another and perhaps the best distinctive character is the constant lack of clearly defined and conspicuous apical white marks on tergites 6 and 7 in *Cratichneumon*. The gastrocoeli are shallow or superficial in *Cratichneumon*, but the thyridia are always distinct.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females, as a rule, short, stout, and filiform, rarely lanceolate, exceptionally bristle shaped; of males slightly nodose, with transverse, inconspicuous bristle ridges on ventral side and with a row of distinct, in a few Nearctic species enormously widened tyloids.

HEAD: Temple profile usually barely or not narrowed behind eyes, sometimes inflated, never very strongly narrowed; malar space usually short; mandibles normal; clypeus usually normal, sometimes depressed, in males sometimes with a small, medio-apical depression, in a few Nearctic males strongly concave, "dish shaped."

THORAX: Mesoscutum usually flat and not or slightly longer than wide; scutellum laterally not carinate, usually flat, in females rarely a little raised above postscutellum, in males more often and more distinctly raised; horizontal part of propodeum in females of the *nigritarius* group flat and somewhat longer, in many other species (including type species) distinctly to considerably shorter

than the area posteromedia, in males always markedly more abbreviated than in females; area superomedia in type species and many other hexagonal, in some species approximately parallel sided and/or confluent with area basalis; costulae present or absent.

LEGS: Usually short and stout in females, with thick femora; coxae III often with scopa.

WINGS: Nervulus postfurcal and oblique; areolet pentagonal, but tending to be narrowed in front; radius almost straight.

ABDOMEN: Of females oxygygous, in type species and most others fairly short and stout; the postpetiole finely sculptured, usually alutaceous, sometimes with a few scattered punctures or smooth, or finely rugose, but as a rule not distinctly aciculate (exception: *unifasciatus* (Say)); median field of postpetiole not very clearly defined; 2nd tergite sculptured likewise; gastrocoeli small and shallow or superficial, sometimes obsolete; thyridia, however, as a rule, recognizable or distinct; in males (as in *Vulgichneumon*) thyridia removed from base of 2nd tergite.

CHROMATIC CHARACTERS: In the majority of American species abdomen red or brown of various shades (with or without sexual dichromatism), in the *nigritarius* group and some other species, black; in the majority of all these species tibiae white or yellow marked beyond base.

SEXUAL DICHROMATISM: In the Palearctic species inconspicuous, in Nearctic fauna often rather considerable, analogous in a few species to the pattern of the American *Ichneumon* species, the abdomen of the female being red, of the male banded with black and yellow; in many species the abdomen of males, in contrast to the associated females, black banded; always head, thorax, and legs in males more extensively white or yellow marked than in females.

DISTRIBUTION: The distribution of *Cratichneumon* is difficult to outline, as it depends on a very arbitrary interpretation of the genus. An abundance of species closely related to the type species is confined to the Holarctic Zone. Similar, but more markedly differentiated forms and groups of forms of perplexing diversity, inhabit the Oriental and Ethiopian Regions, and probably will be found also in the mountains of the Neotropic Region; a few species are recorded from Central America.

Key to southeastern species of *Cratichneumon* Thomson

FEMALES

1. Abdomen uniformly black. (Medium-sized species, 12-17 mm long). 2
- Abdomen at the most partially black, usually red or orange ferruginous. (Medium-sized or small species). 5
2. Wings strongly and evenly infuscated; scutellum and tibiae III uniformly black. (Coxae III without scopa; median field of postpetiole often acciculate; length 12-17 mm). 1 a. *unifasciatus* (Say)
- Wings not infuscated; scutellum and dorsal side of tibiae III white marked. 3
3. Coxae III with large scopa. (Flagellum moderately long and moderately slender, slightly attenuated toward apex; coxae II with indication of a small scopa; length 13-14 mm). 3. *proximus* (Cresson)
- Coxae III without scopa. 4
4. Flagellum filiform, stout; femora III very stout and short, less than 3 times as long as medially wide in lateral view. (Length 9-15 mm). 2. *sublatus* (Cresson)
- Flagellum distinctly attenuated toward apex, slender; femora III long and slender, about 4 times as long as medially wide. (Length 15-17 mm). 4. *tyloidifer* Heinrich
5. Frons with very coarse, vertical wrinkles. (Predominantly light orange ferruginous, scutellum yellow; 2nd tergite extremely densely punctured, without space between punctures, opaque; coxae III with scopa; length 12 mm). 28 a. *volens volens* (Cresson)
- Frons without vertical wrinkles. 6
6. Coxae III with scopa. 7
- Coxae III without scopa. 22
7. Second tergite alutaceous or finely coriaceous, without or with extremely fine, microscopic puncturation. (Small species, 5-12 mm long; tibiae III medially white or ivory at least on dorsal side; flagellum filiform or subfiliform). 8
- Second tergite distinctly, more or less densely punctured. (Mostly larger species; tibiae III with or without white or ivory median mark; flagellum bristle shaped to filiform). 10

8. Postpetiole with apical ivory band or marks; at least vertical orbits, often also frontal and outer orbits ivory marked. (2nd tergite finely coriaceous, without puncturation; length 8-12 mm). 21. *paraparatus* Heinrich
- Postpetiole and head without ivory marks. (Length 5-11 mm). 9
9. Basic color of entire body orange ferruginous; basal $\frac{1}{2}$ of 2nd tergite with very fine, moderately dense puncturation. (Tibiae III only rarely blackish infuscated on dorsal side, before and beyond ivory mark). 22 b. *paratus pseudovinnulus* Heinrich
- Basic color of body blood red; entire 2nd tergite alutaceous and shiny, without puncturation. (Tibiae III dorsally coal black, with white annulus beyond base). 23. *floridensis* Heinrich
10. Mesoscutum ferruginous, usually except narrowly black surrounding sutures. 11
- Mesoscutum more extensively to entirely black, often with ivory, or red, or ivory surrounded by red median mark. .. 13
11. Flagellum filiform; small species 7-9 mm long; tibiae III fulvous, broadly black apically. (Horizontal part of propodeum weakly and incompletely carinate). 24. *vescus* (Provancher)
- Flagellum bristle shaped; larger species, 10-13 mm long; tibiae III ferruginous, with or without median yellowish mark on dorsal side. 12
12. Tibiae III uniformly ferruginous, without a trace of a yellow mark on dorsal side; temple profile slightly narrowed behind eyes; cheeks in lateral view slightly convex. 19. *naumanni* Heinrich
- Tibiae III ferruginous, with ill-defined, median, yellowish mark on dorsal side; temple profile slightly widened behind eyes; cheeks in lateral view very wide and inflated 18. *erythroscuta* Heinrich
13. Tibiae III without dorsal yellow or ivory mark. 14
- Tibiae III with median ivory or yellow mark on dorsal side. 17
14. Cheek profile not narrowed toward mandible base, outline of head in frontal view almost square; area posteromedia not longer than horizontal part of propodeum medially; hair of scopa sparse. (Flagellum subfiliform, only slightly attenuated toward apex; length 12-15 mm). 6. *anisotae* Heinrich
- Cheek profile somewhat narrowed toward mandible base, outline of head in frontal view not square; area posteromedia longer than horizontal part medially; scopa dense. 15
15. Postpetiole black with apical ivory band; mesopleura, pronotal base, and cheeks black; flagellum slender, barely widened beyond middle, a trifle tapering toward apex. (Length 13-15 mm). 8. *pseudanisotae* Heinrich
- Postpetiole red, without apical ivory band (sometimes with medio-apical, ivory mark); mesopleura with conspicuous ivory band, pronotal base and cheeks ivory; flagellum strongly widened beyond middle and strongly tapering toward apex. (Length 14-15 mm). 5a. *variegatus* (Provancher) 16
16. Tergites 2-4 with basal blackish bands. . 5c. *variegatus fuscovariegator*, new subspecies
- Tergites 2-4 without blackish bands .. 5b. *variegatus insignitus* Heinrich
17. Tarsi III and propodeum uniformly black. (Tibiae III dorsally black, with ivory mark beyond base; head and femora III predominantly blood red; length 10-12 mm). 10. *austropiceipes* Heinrich
- Tarsi III predominantly or entirely ivory or orange ferruginous; at least declivity of propodeum marked with ivory or orange. 18
18. Tibiae III dorsally blackish infuscated before and beyond ivory mark; mesoscutum usually with ferruginous median area, but usually without distinct ivory mark. 19
- Tibiae III ferruginous or orange, at the most slightly infuscated at the extreme end; mesoscutum with conspicuous, median ivory mark; coxae III dorsally extensively ivory marked. (Frontal and temple orbits broadly ivory). 20
19. Frontal, and particularly temple orbits broadly ivory; coxae III with large dorsal ivory mark. (Small ivory mark on upper facial orbits; median field of face and the clypeus usually orange; length 12-14 mm). 11c. *w-album fuscior* Heinrich

- Head predominantly ferruginous, without ivory marks; coxae III ferruginous, without ivory mark. (Length 9-11 mm).
..... 12. *louisianae* Heinrich
- 20. Flagellum subbristle shaped, distinctly attenuated toward apex, markedly widened beyond middle, the widest segment more than twice as wide as long on the flat side. (Head ferruginous including frons between black antennal cavities and black ocellar region; mesoscutum around ivory median mark ferruginous, sometimes mesoscutum predominantly so-colored; length 14-16 mm). 7. *georgius* Heinrich
- Flagellum subfiliform, only slightly attenuated toward apex, and only slightly widened beyond middle. ... 21
- 21. Cheek profile in frontal view barely narrowed toward mandible base; eyes not bulging; flagellum rather stout: the 1st segment 1.5 times as long as apically wide, the 5th segment approximately square in lateral view, the widest segment on the flat side 1.5 to 2 times as wide as long. (Length 12-15 mm).
..... 6. *anisotae* Heinrich
- Cheek profile in front view markedly narrowed toward mandible base; eyes somewhat bulging; flagellum fairly long and slender: the 1st segment twice as long as apically wide, the 7th or 8th square in lateral view, the widest 1-1.5 times as wide as long. (Length 11-15 mm).
..... 9. *subfiliatus* Heinrich
- 22. Tibiae III with ivory or yellow mark on dorsal side beyond base. 23
- Tibiae III ivory at base and beyond, infuscated apically, or uniformly orange. (Small species, 4-9 mm long). 27
- 23. Flagellum filiform or subfiliform, rather short; head, in front view, wide, approaching a square outline. (Propodeum not abbreviated). 24
- Flagellum bristle shaped, fairly long; head in front view distinctly narrowed toward mandibles and not approaching a square outline. 25
- 24. Larger species, 12-15 mm long; mesoscutum predominantly black, with median ivory mark; coxae III with indistinct scopa; flagellum slightly attenuated toward apex. 21
- Smaller species, 10-14 mm long; mesoscutum predominantly or entirely ferruginous, without median mark; coxae III without trace of scopa; flagellum very short, exactly filiform, and not at all attenuated at apex.
..... 14. *ritus* Heinrich
- 25. Mesopleura, metapleura, and mesoscutum black, the latter with median ivory mark; postpetiole with apical ivory band or marks. (Area posteromedia markedly longer than horizontal part of propodeum medially; ovipositor distinctly projecting; length 9-15 mm).
..... 16. *vinnulus* (Cresson)
- Mesopleura, metapleura, and mesoscutum not black together; postpetiole without apical ivory band or marks. (Length 8-10 mm). 26
- 26. Propodeum strongly abbreviated, the area posteromedia about twice as long as horizontal part medially; area superomedia in front contiguous with basal furrow of propodeum and strongly transverse; flagellum slightly attenuated apically.
..... 15. *insulae* Heinrich
- Propodeum not abbreviated, the area posteromedia not much longer than horizontal part medially; area superomedia confluent with area basalis and forming a nearly parallel sided, longer than wide central area; flagellum markedly attenuated apically.
..... 17. *horani* Heinrich
- 27. The 2nd tergite with very fine, alutaceous sculpture, without puncturation; metatarsus III more or less distinctly infuscated. (Flagellum exactly filiform, slender, tapering toward base; length 4-5 mm).
..... 25 b. *flavipectus mississippi* Heinrich
- The 2nd tergite with distinct, though fine puncturation; metatarsus III not infuscated. 28
- 28. Flagellum bristle shaped, slender; basic color of body and legs light orange, head, mesopleura, and propodeum ivory marked. (Length 8-9 mm).
..... 20. *carolinae* Heinrich
- Flagellum exactly filiform; basic color of body and legs orange ferruginous, without ivory marks except sometimes on orbits. 29
- 29. Scutellum ferruginous; femora III at least apically, sometimes entirely black; horizontal part of propodeum slightly more than 1/2 as long as area posteromedia. (Tibiae III apically infuscated, shading to ivory toward base; vertical

- orbits without ivory mark; carination of propodeum incomplete; length 7-8 mm).
..... 27. *scitulus* (Cresson)
- Scutellum ivory; femora III apically not infuscated; horizontal part of propodeum almost as long as area postero-media. 30
30. Vertical orbits ivory marked; tibiae III uniformly orange, apically not infuscated and not shading into ivory toward base; tibiae I and II without dorsal ivory mark beyond base. (Length 7-9 mm)...
... 26 b. *facetis austroriparius*, new subspecies
- Vertical orbits not ivory marked; about apical 1/3 of tibiae III infuscated, shading into a faint indication of an ivory mark toward middle and into pale orange toward base; tibiae I and II with inobtrusive ivory mark on dorsal side beyond base. (Length 6 mm)
29 c. *annulatus facetops* Heinrich

MALES

1. Abdomen uniformly black, except sometimes white markings on postpetiole. 2
- Abdomen with red or orange or yellow parts or markings. 5
2. Flagellum with unusually large, longish-oval tyloids, the longest, on segments 8-14, covering the entire length of these segments. (Postpetiole usually with latero-apical white spots; dorsal white stripe on tibiae III beyond base; length 15-17 mm).
..... 4. *tyloidifer* Heinrich
- Flagellum with narrow tyloids of usual size. 3
3. Postpetiole medially longitudinally striate or rugose; mesoscutum, propodeum, coxae III and metatarsus III never with white marks; postpetiole often with apical white band. (Wings usually slightly infuscated; length 14-18 mm).
..... 1 a. *unifasciatus* (Say)
- Postpetiole medially not longitudinally striate or rugose, but shiny and nearly smooth; mesoscutum and propodeum, sometimes also coxae III and metatarsi III, marked with white. 4
4. Coxae III with conspicuous, dorsal white mark; tibiae III with long white stripe on exterior side beyond base; metatarsus III usually with dorsal white stripe beyond base. (Length 14-16 mm).
..... 3. *proximus* (Cresson)
- Coxae III without dorsal white mark; tibiae III narrowly white at the base, the white extending for a short length along exterior side of tibiae; metatarsus III white at the extreme base only. (Length 14-17 mm).
..... 2. *sublatus* (Cresson)
5. Frons with vertical rugosity between ocelli and antennal cavities. (Head, thorax, abdomen, and legs predominantly orange, tergites 2-5 with basal black bands; length 15 mm).
..... 28 a. *volens volens* (Cresson)
- Frons without vertical rugosity. 6
6. Tyloids unusually large and wide (fig. 33, 37). (Clypeus at least medially concave, sometimes entirely concave; mesoscutum black, with conspicuous median white mark; tibiae III apically not black; large species, 15-20 mm long). 7
- Tyloids of normal, small size and narrow shape. 10
7. Largest tyloids, on flagellar segments 9-14, enormously widened, about as wide as long (fig. 37). (Tibiae III usually with a short, ill-defined, yellowish mark on dorsal side beyond base, their extreme base usually blackish; most tergites with large, bipartite, blackish patches on dorsal side; length 15-18 mm).
..... 6. *anisotae* Heinrich
- Largest tyloids, on flagellar segments 9-14 (fig. 33) less strongly widened, elliptic, about twice as long as wide (covering entire length of segments). 8
8. Tibiae III with more or less extensive yellowish section on dorsal side beyond base; clypeus only slightly concave; tergites 2-7 as a rule uniformly orange, exceptionally and at the most tergites 2 and 3 with restricted blackish-infuscated blotches; color of mesosternum varying from entirely ivory as a rule, to rarely extensively black. (Carina oralis at mandible base markedly lamelliformly raised; length 15-17 mm).
..... 7. *georgius* Heinrich
- Tibiae III uniformly pale orange; clypeus strongly concave from side to side, "dish shaped;" tergites 2-4 or to 6 with large, blackish-infuscated patches; mesosternum always ivory. (Length 16-29 mm).
..... 5a. *variegatus* Provancher. 9
9. Flagellum ventrally pale orange; tergites 2-4, usually the 5th and rarely even

- the 6th with apically bipartite, wide, blackish-infuscated, longitudinal bands which decrease in length, and in intensity of color, gradually from tergite to tergite; 1st segment black, with ivory lateral surfaces and large apical ivory mark on median field of postpetiole....
- .. 5b. *variegatus insignitus* Heinrich
- Flagellum ventrally black; black markings on tergites deeper black and more extensive, tergites 1-3 predominantly black; lateral surfaces of 1st segment partially or entirely black. 5 c. *variegatus fuscovariegator* Heinrich
10. Tibiae III without basal black section, sometimes apically infuscated or black. 11
- Tibiae III basally narrowly and at the same time apically broadly black or blackish, at least on dorsal side, ivory between black sections. 18
11. Prescutellar carinae and a short line on each side of mesoscutum in front of prescutellar carinae ivory. (Mesoscutum ferruginous, varying sometimes to partially or predominantly black; propodeum and abdomen uniformly orange or ivory; length 8-13 mm). 11 a
- Prescutellar carinae not ivory marked, no short ivory lines on each side of mesoscutum in front of prescutellar carinae. 12
- 11a. Tibiae III ivory for about the basal 2/3 of their length, then shading toward apex into obscure orange; tarsi III ivory; propleura extensively black; malar space about 1/3 as long as width of mandible base; sculpture of area superomedia and of area posteromedia finely, irregularly rugose and shiny. (Length 9-13 mm). 29 c. *annulatipes facetops* Heinrich
- Tibiae III and tarsi III uniformly pale orange ferruginous; propleura uniformly pale orange; malar space subobsolete; sculpture of area superomedia and of area posteromedia coarsely irregularly rugose (of area posteromedia mainly transversely rugose) and barely shiny. (Length 8-10 mm). 26 b. *facetops austroriparius* Heinrich
12. Tibiae III basally more or less extensively ivory, apically sometimes infuscated or black. 13
- Tibiae III orange or ferruginous throughout, not ivory at base, but sometimes with ivory or yellowish mark beyond base on dorsal side. (Mesoscutum black, with conspicuous median ivory mark). 15
13. Mesoscutum black, with median ivory mark; tergites 1 and 2 predominantly black, 3-7 orange, 3-4 or 5 with basal black or blackish bands, 1 and 2 with ivory apical bands, the 2nd tergite orange between black and ivory sections. (Tibiae III ivory, apically broadly black; tergites 2 and 3 extremely finely coriaceous, the 2nd with fine and shallow, the 3rd with still finer, indistinct puncturation; length 9-14 mm). 21. *paraparatus* Heinrich
- Mesoscutum ferruginous or orange, sometimes with ivory mark; abdomen differently colored. 14
14. Middle of frons, occipital region, and apices of tibiae III and of femora III black or blackish; mesoscutum without median ivory mark. (Abdomen orange ferruginous, tergites 1 and 2 rarely apically ivory; length 6-10 mm). 27. *scitulus* (Cresson)
- Middle of frons ivory, occipital region, apices of tibiae III and entire femora III orange; mesoscutum orange, with bipartite, median ivory mark. (Abdomen orange, tergites 1 and 2 with apical ivory bands; length 8 mm). 20. *carolinae* Heinrich
15. Very small species, 6-9 mm long; segment 1 or 1 and 2 of tarsi III blackish infuscated; tibiae III blackish infuscated at apex, ivory tinged toward base; 2nd tergite finely coriaceous, without distinct puncturation. (Tergites 2-7 usually uniformly orange ferruginous, rarely anterior tergites with blackish infuscated basal bands). 25 b. *flavipectus mississippi* Heinrich
- Larger species, 11-17 mm long; tarsi III without infuscations; tibiae III orange throughout, with or without ivory mark beyond base on dorsal side, sometimes very narrowly infuscated basally; 2nd tergite distinctly punctured. 16
16. Area metapleuralis ivory; tibiae III usually with faintly ivory-tinged area beyond base on dorsal side, often infuscated at the very base. 19. *naumanni* Heinrich
- Area metapleuralis predominantly or entirely black; tibiae III either pale orange throughout or orange with ivory mark beyond base on dorsal side. 17

17. Upper surface of abdomen predominantly black, the extent of apical fulvous bands of tergites gradually increasing from tergite to tergite, the last 2 tergites predominantly to entirely fulvous; tibiae III uniformly pale orange. (Clypeus with distinct, but not extensive, apico-median depression; length 12-17 mm).
..... 8. *pseudanisotae* Heinrich
- Abdomen uniformly orange, except the basally black and apically ivory 1st segment; tibiae III orange, with ill-defined yellowish mark on dorsal side beyond base. (Clypeus with small, sometimes indistinct apico-median impression; eyes somewhat bulging; length 11-15 mm).
..... 9. *subfilatus* Heinrich
18. Flagellum without white annulus; abdomen predominantly black, tergites 1-3 with broad apical yellow bands, the 2nd tergite often also basally yellow. (Length 9-13 mm).
..... 24. *vescus* (Provancher)
- Flagellum with white annulus; abdomen differently colored 19
19. Mesosternum predominantly black, at least between middle and sternali, and also area metapleuralis predominantly to entirely black. 20
- Mesosternum ivory, area metapleuralis predominantly orange or ivory or black. 23
20. Propodeum strongly abbreviated, the area superomedia strongly transverse, horizontal part of propodeum medially less than 1/2 as long as area postero-media. (Declivity and most of horizontal part of propodeum ivory; length 10-12 mm).
..... 15. *insulae* Heinrich
- Propodeum not strongly abbreviated. 21
21. Tarsi III entirely or predominantly black; tyloids rather short, narrowly oval, the longest covering little more than median 1/2 of length of segments. (Femora III red, with blackish apex; length 13 mm).
..... 10. *austropiceipes* Heinrich
- Tarsi III ivory or pale orange; tyloids comparatively longer. 22
22. Larger species, 14-17 mm long; tyloids longish oval, fairly large, slightly approaching the shape of the tyloids of *georgius* Heinrich, the longest, however, not reaching to bases and apices of segments; tergites 2-7 uniformly orange ferruginous without infuscated marks.
..... 13. *excors*, new species
- Smaller species, 11-12 mm long; tyloids narrow, nearly bacilliform; tergites 2-7 red, tergites 2 and 3 as a rule with more or less extensive infuscations.
..... 12. *louisianae* Heinrich
23. Area metapleuralis predominantly or entirely black. 24
- Area metapleuralis predominantly or entirely ivory or orange. 26
24. Femora III black, ivory toward base on ventral side, orange toward base on dorsal side; propodeum not markedly abbreviated, area superomedia not transverse. Second tergite alutaceous and shiny, with sparse and very fine puncturation on basal 1/2, 3rd tergite shiny, without distinct puncturation; abdomen pale orange, shading into yellowish toward base, at least 2nd tergite, often also the 3rd with, usually bipartite, infuscated mark beyond middle; length 11-14 mm).
..... 14. *ritus* Heinrich
- Femora III red or orange, usually with infuscated tip; propodeum markedly abbreviated, area superomedia transverse 25
25. Tergites 2-7 uniformly orange; declivity of propodeum, horizontal part (except black areae superoexternae), and areae spiraculiferae ivory or orange-tinged ivory; tibiae III on dorsal side narrowly blackish infuscated at base, more broadly at apex, orange-tinged ivory between infuscated sections. (Length 10-12 mm).
..... 15. *insulae* Heinrich
- Tergites 2-4 more or less extensively black basally, with ill-defined, apical ivory-tinged bands, orange ferruginous between black and ivory-tinged parts, at least tergites 5-7 uniformly orange, sometimes also basal black parts of preceding tergites reduced or obsolete; tibiae III narrowly deep black basally on dorsal side, broadly deep black apically, clear ivory between black sections. (Tergites 2 and 3 with distinct puncturation; length 9-14 mm).
..... 16. *vinnulus* (Cresson)
26. Propodeum strongly abbreviated, area posteromedia more than twice as long as horizontal part medially; area superomedia transverse. (Propodeum ivory or ivory-tinged orange, except black areae

- superoexternae and areae coxales; length 10-12 mm). 15. *insulae* Heinrich
- Propodeum not strongly abbreviated and less extensively ivory or orange marked. 27
27. Abdomen uniformly orange, including entire 1st segment, the latter with apical ivory band or mark; speculum on mesopleura black, included in the black band below subalarum; row of tyloids beginning on 7th or 8th flagellar segment; tergites 2 and 3 distinctly and densely punctured. (Length 9-11 mm). 17. *horani* Heinrich
- Abdomen not uniformly orange: either (1) anterior tergites with more or less extensive basal black and apical ivory bands, or (2) abdomen sometimes without infuscations, but of vivid, blood-red color; speculum on mesopleura ivory, surrounded below by a black line; row of tyloids beginning on the 4th or 5th flagellar segment; the 3rd tergite either almost impunctate, or with very fine, microscopic punctation. 28
28. Abdomen uniformly vivid blood red, petiole usually ventrally and dorsally more or less extensively black, often 2nd tergite, rarely also the 3rd, basally more or less blackish infuscated and/or with microscopic, shallow, and sparse punctation. (Length 6-12 mm). 23. *floridensis* Heinrich
- Abdomen orange, 1st tergite usually black with apical ivory band, tergites 2 and 3, sometimes also 4 with basal black bands or markings of variable extent, apically usually ivory tinged; 3rd tergite with very fine, shallow, fairly dense punctation to beyond middle. (Length 9-13 mm). 22 c. *paratus pseudovinnulus* Heinrich

1a. *Cratichneumon unifasciatorius*
unifasciatorius (Say)
Map 57

Ichneumon unifasciatorius Say, 1825:48, male.

Ichneumon malacus Say, 1828:72, female.

Ichneumon niger Brullé, 1846:302, female, male.

Ichneumon afer Cresson, 1864:138, female.

Ichneumon scriptifrons Cresson, 1877:144, male.

Ichneumon aterrimus Provancher, 1886:30, female.

Cratichneumon unifasciatorius, Townes and Townes, 1951:289. Heinrich, 1961:108-109, female, male.

Holotypes: *Ichneumon unifasciatorius*, male, in Harris collection; MCZ. *Ichneumon malacus*, lost. *Ichneumon niger*, female; MNHN. *Ichneumon afer*, female; ANS. *Ichneumon scriptifrons*, male; ANS. *Ichneumon aterrimus*, female, not found.

SYSTEMATICS: A somewhat aberrant species of this genus, differing in both sexes from all other species mainly by the rather coarse sculpture of the postpetiole, which is either irregularly rugose or medially longitudinally striate, and also by prominent apices of the areae dentiparae.

Females are uniquely distinguished by evenly and deeply infuscated wings, combined with uniformly black body and legs, without any white markings, except white flagellar annulus. In contrast to the female, the male usually shows fairly extensive white markings on head, tibiae, scutellum, and often also abdomen; the wings of the male are only slightly to moderately infuscated; the hypopygium of male projects triangularly in the middle.

FEMALE: Length 12-17 mm. Uniformly black, including legs; wings intensively infuscated; flagellum with nearly complete white annulus on segments 8 or 9 to 16 or 17; scape black.

FLAGELLUM: Moderately long, bristle shaped, though only slightly attenuated toward apex, a trifle widened beyond middle, with 38-42 segments, the 1st fully twice as long as apically wide, in lateral view the 8th square, the widest on the flat side not quite 1.5 times as wide as long.

HEAD: Temple profile not narrowed behind eyes, slightly curved; cheek profile distinctly narrowed toward mandible base, straight; malar space comparatively long, nearly as long as width of mandible base; median field of face moderately protruding; clypeus with a few, coarse, scattered punctures, face coarsely and densely, frons more densely and less coarsely punctured; mandibles normal.

THORAX: Mesoscutum moderately convex, coarsely and densely punctured; anterior 1/3 of notauli distinct; scutellum somewhat raised above postscutellum, also fairly coarsely and densely punctured; area postero-media markedly longer than horizontal part of propodeum medially and steeply sloping; area supero-media usually wider than long and approximately horseshoe shaped, often confluent with area basalis and with

costulae, if base of the latter indicated, behind middle; costulae obsolete or basally indicated, otherwise carination complete; apices of areae dentiparae apically somewhat prominent; mesopleura and metapleura very coarsely and densely rugose punctate, lower half of propleura with coarse, mainly longitudinal rugae.

LEGS: Moderately stout; coxae III ventrally densely and coarsely punctured, without scopa.

WINGS: Nervulus practically interstitial; areolet pentagonal, but strongly narrowed in front; radius long, slightly curved at apex.

ABDOMEN: Postpetiole with basally distinct, gradually flattened toward apex, median field of variable sculpture: usually coarsely irregularly rugose, sometimes longitudinally striate; gastrocoeli barely impressed, irregularly rugose, thyridia distinct; 2nd tergite coarsely and extremely densely punctured, subopaque, the 3rd tergite densely and very finely, toward apex sparsely punctured, extremely finely coriaceous between punctures, the following tergites practically impunctate, extremely finely coriaceous.

MALE: Length 14-18 mm. Black, with white markings of varying extent on head, thorax, legs; face and clypeus varying from almost entirely black to almost entirely white; in Florida specimens the following also white: base of mandibles, mark or stripe on outer orbits, mark or stripe on frontal orbits, collare, pronotal ridge, subalarum, tegulae, scutellum except base, postscutellum, apical band on postpetiole, apices of all femora dorsally, entire dorsal side of all tibiae, usually a stripe on dorsal side of metatarsi II and III, and tarsi I dorsally, sometimes also tarsi II more extensively; wings less strongly infuscated as in female, sometimes almost clear; flagellum black, usually with complete white annulus on segments 12 (apex) or 13 or 14 to 17 or 18 or 20; scape ventrally white or with white mark of varying size; flagellum sometimes without annulus.

FLAGELLUM: With 37-41 segments and with bacilliform tyloids on segments 7-18 or 19.

HEAD: Malar space about $1/2$ as long as width of mandible base.

THORAX: Scutellum distinctly more raised than in female; propodeum more abbreviated, the area superomedia comparatively shorter and wider.

ABDOMEN: Thyridia slightly removed from base of 2nd tergite; puncturation of 2nd tergite slightly less dense and less coarse, of 3rd tergite slightly coarser and denser than in female; hypopygium medially triangularly projecting.

VARIATION: One male from Mississippi has a white apical band also on the 2nd tergite.

DISTRIBUTION (map 57): Quebec, south to Florida, west to Louisiana and Tennessee; western limits of distribution still unexplored. **FLORIDA.** Highlands Co.: 3 females, 2 males, Archbold Biological Station, G. Heinrich; 1 male, Highlands Hammock State Park, 28-IV-1968, G. Heinrich. Lee Co.: 2 males, Ft. Myers, 17-21-IV-1968, G. Heinrich. **LOUISIANA.** Avoyelles Co.: 2 males, Eola, 13-20-IV-1972, D. Shaneck. Natchitoches Co.: 1 male, Natchitoches, 11-VI-1971, G. Heinrich. **MISSISSIPPI.** Lafayette Co.: 2 females, Oxford (University collection). Oktibbeha Co.: 1 female, 1 male, Starkville, 5-17-IV-1970 (University collection); 6 males, 14-IX-30-X-1970, 2 females, 7-V-9-VII-1971, C. Sartor. Yalobusha Co.: 1 female, Water Valley, 17-23-IX-1970, M. Horan. **TENNESSEE.** Henderson Co.: 1 male, Natchez Trail State Park, 11-14-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II unless noted otherwise.



Map 57. *Cratichneumon unifasciatorius unifasciatorius* (Say)

HOSTS: *Orgyia leucostigma* (J. E. Smith) and *Orgyia antiqua* (L.) (Lymantridae); *Arctia* sp., *Diacrisia virginica* (F.), *Halisidota caryae* (Harris), and *Halisidota tessellaris* (J. E. Smith) (Arctiidae); *Acronycta obliterata* (J. E. Smith) (Noctuidae).

1b. *Cratichneumon unifasciatorius vancouveriensis* (Provancher)

Ichneumon vancouveriensis Provancher, 1885:114, male.

Cratichneumon unifasciatorius vancouveriensis, Heinrich, 1961:109-110, male, female.

Holotype: male, Vancouver Island, British Columbia; CNC (No. 2376).

MALE: Length 14-18 mm. Considerably less white marked than *unifasciatorius*. Flagellum without annulus; clypeus and face entirely black or the latter with 2 small marks on the upper end of the median field; postpetiole without apical white band; tibiae III with restricted white pattern, more often entirely black than white striped; white on pronotal ridge and tegulae usually restricted or absent.

DISTRIBUTION: British Columbia.

HOSTS: One male (in CNC) bred in British Columbia from Arctiidae, probably *Halisidota argentata* Pack.

2. *Cratichneumon sublatus* (Cresson)
Map 58

Ischnus sublatus Cresson, 1864:186, male.

Ichneumon pravus Cresson, 1877:151, female.

Cratichneumon sublatus, Townes and Townes, 1951:289, female, male. Heinrich, 1961:111-112, female, male.

Holotypes: *Ischnus sublatus*, male, Illinois, and *Ichneumon pravus*, female, Canada; ANS.

SYSTEMATICS: This species represents a small group of rather conspicuous species, distinguished chromatically by black basic color of the body, including abdomen, combined with white pattern on all tibiae. Females of this species are readily identified by the combination of: (1) coxae III without scopa; (2) flagellum filiform, stout, not attenuated at apex. Indicative chromatic characters of the male are the narrowly white base of metatarsus III and white median mark on mesoscutum, among other white markings.

FEMALE: Length 9-15 mm. Black, the following white: frontal orbits narrowly, rarely marks on vertical orbits, usually

collare, apex of pronotal ridge and subalarum, rarely entire pronotal ridge and apex of scutellum, always oblong dorsal marks beyond base on all tibiae; clypeus sometimes reddish; basic color of tibiae and tarsi I and II brownish; flagellum with complete white annulus on segments 8 to 14 or 15.

FLAGELLUM: Filiform, hardly widened beyond middle, not attenuated at apex, with 32-34 segments, the 1st about 1.3 times as long as wide, the 5th in lateral view square, the widest slightly wider than long.

HEAD: Temple profile and cheek profile barely narrowed behind eyes, curved; cheeks in lateral view wide, distinctly inflated; malar space markedly shorter than width of mandible base; clypeus short, wide, flat, and smooth, with a few scattered coarse punctures on base; face and clypeus forming a plane, in lateral view markedly receding from upper margin toward mandibles.

THORAX: Mesoscutum and scutellum flat, shiny, with sparse and fairly fine puncturation; notauli subobsolete; carination of propodeum complete, except costulae obsolete; area superomedia usually longer than wide.

LEGS: Very short and stout; femora III less than 3 times as long as medially wide in lateral view; coxae III without scopa.

ABDOMEN: Postpetiole finely coriaceous and rugose; gastrocoeli and thyridia subobsolete; 2nd tergite distinctly and rather densely punctured, the 3rd alutaceous, with sparse, extremely fine punctures on median part.

MALE: Length 14-17 mm. Black, the following white: mandibles except teeth, clypeus, face, frontal orbits up to level with lower ocellus, cheeks including malar space, outer orbits up to vertex, collare, pronotal ridge, apex of pronotal base, subalarum, tegulae, median mark on mesoscutum, scutellum except base, postscutellum, 2 marks on propodeum (covering the areae posteroexternae together with apices of areae dentiparae), coxae I and II except bases, usually apical mark on ventral side of coxae III, all trochanters I and II, 2nd trochanters III, anterior side of femora I and II and tibiae I and II, narrow basal annulus on tibiae III, connected with a longitudinal stripe of varying length on their exterior side, usually covering about 2/3 of the length of the tibiae, entire tarsi I and II, and narrow base of metatarsus III; flagellum black, ventrally brownish; as a rule without, rarely with white annulus; scape ventrally white.



Map 58. *Cratichneumon sublatus* (Cresson)

FLAGELLUM: With 41-43 segments and with narrow elongate-elliptic tyloids on segments 4 or 5 or 6 to 17 or 18 or 19.

DISTRIBUTION (map 58): Quebec and Ontario west to Illinois, south to Arkansas. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 16-20-V-1972, G. Heinrich, D. Shaneck (CGH II).

HOSTS: *Heterocampa guttivitta* (Walker) (Townes and Townes, 1951). *Heterocampa* confirmed as host by further rearing in Maine (Heinrich, 1961).

3. *Cratichneumon proximus* (Cresson) Map 59

Ischnus proximus Cresson, 1864:187, male.

Ichneumon sagus Cresson, 1867:194, female.

Cratichneumon proximus, Townes and Townes, 1951:288, female, male. Heinrich, 1961:112-114, female, male.

Holotypes: *Ischnus proximus*, male, Pennsylvania, and *Ichneumon sagus*, female, Illinois; ANS.

SYSTEMATICS: A 2nd species of the *sublatus* group; females are distinguished by an unusually large scopa, covering nearly the entire length of ventral side of coxae III, and an indication of a small scopa also on coxae II, combined with a more slender, apically somewhat attenuated flagellum; males are similar in color to the preceding species, but differ by dorsally white-marked

coxae III and by the white annulus of flagellum.

FEMALE: Length 13-14 mm. Black, the following white: temple orbits narrowly, collare, scutellum except base, postscutellum, and all tibiae dorsally except bases and apices; frontal orbits ferruginous; flagellum with white annulus on segments 8-16; scape black.

FLAGELLUM: Moderately long and slender, slightly widened beyond middle and slightly attenuated toward apex, with 36 segments, the 1st about twice as long as apically wide, in lateral view the 9th square, the widest on the flat side about 1.5 times as wide as long.

HEAD: Temple profile and cheek profile barely narrowed behind eyes and toward mandibles respectively, distinctly curved; cheeks in lateral view broad, markedly inflated, polished, with a few shallow, scattered punctures; malar space considerably shorter than width of mandible base.

THORAX: Mesoscutum fairly sparsely punctured, polished between punctures; anterior 1/3 of notauli fairly distinct; scutellum not raised above postscutellum, flat, smooth, with a few scattered punctures; area posteromedia slightly longer than horizontal part of propodeum medially; carination complete, including costulae, only carinae coxales lacking and area superomedia confluent with area basalis.

LEGS: Fairly stout; femora III little more than 3 times as long as medially wide; coxae III moderately densely punctured, with unusually large scopa, reaching close to the base of coxae; coxae II also with small weak scopa.

WINGS: Nervulus practically interstitial; infuscated.

ABDOMEN: Postpetiole without distinct median field, with a few scattered fine punctures and extremely fine rugosity; gastrocoeli obsolete, thyridia distinct; 2nd tergite finely and moderately densely punctured to beyond middle, about apical 1/3, as the following tergites, without punctures and extremely finely coriaceous.

MALE: Length 14-16 mm. Black, the following white: clypeus and face entirely, base of mandibles, orbits around eyes broadly (white band interrupted on vertex and on malar space, widened somewhat on upper frons, strongly and nearly over whole width of cheeks on lower outer orbits), collare, pronotal ridge, subalarum, tegulae, scutellum, postscutellum, usually median mark on mesoscutum, declivity of propodeum (except

black area posteromedia), coxae I and II and 1st trochanters I and II ventrally more or less extensively, sometimes nearly entirely, large mark on dorsal side of coxae III, all tibiae dorsally (the tibiae III except broadly black apex and usually narrowly black base), tarsi I and II dorsally more or less extensively, usually predominantly, sometimes dorsal stripe on metatarsus III, and femora I and II ventrally toward apex or predominantly (except bases); flagellum with complete white annulus on segments 14 or 15 to 21 or 22; scape ventrally white.

FLAGELLUM: With 37-40 segments and with narrow, elongate-oval tyloids on segments 7 or 8 to 16 or 17 or 20, the longest by far not reaching bases and apices of segments.

HEAD: Malar space not quite $1/2$ as long as width of mandible base; clypeus normal, without distinct apico-median impression; median field of face moderately raised, with distinct, longitudinal, lateral impression and transverse apical impression separating it from clypeus.

THORAX: Anterior $1/3$ of notauli much more pronounced than in female; scutellum markedly more raised above postscutellum, dorsally nearly flat, apically truncate and sloping; area superomedia, as in female, usually confluent with area basalis and approximately as long as wide, sometimes slightly wider than long.

ABDOMEN: Sculpture of postpetiole varying from almost smooth to sparsely punctured; gastrocoeli indicated by some longitudinal rugae, with thyridia removed from base of 2nd tergite; hypopygium triangularly projecting medially.

DISTRIBUTION (map 59): Ontario and Michigan south to Florida, west to Illinois, Louisiana, and Arkansas. **ARKANSAS.** Garland Co.: 1 female, 5 males, 9-18-V-1972, G. Heinrich, D. Shaneck. **FLORIDA.** Hillsborough Co.: 2 males, Hillsborough State Park, 8-9-VI-1970, G. Heinrich. Lee Co.: 6 males, Ft. Myers, 25-III-24-V-1968, G. Heinrich. Volusia Co.: 1 male, Daytona Beach, 17-XI-1972, D. Radtke. **GEORGIA.** Monroe Co.: 1 male, Forsythe, 14-IV-1971, G. Heinrich. **LOUISIANA.** Avoyelles Co.: 4 males, 2 females, Eola, 13-IV-15-V-1972, D. Shaneck. Evangeline Co.: Bayou Chicot, 8 males, 22-IX-20-X-1971, 2 males, 15-29-III-1972, D. Shaneck; 3 females, 14 males, Chicot State Park, 24-V-28-VI-1971, G. Heinrich. Natchitoches Co.: 2 females, 17 males, Natchitoches, 11-19-VI-1971, G. Heinrich. Webster Co.: 3 females, 2 males, Bistineau State Park,



Map 59. *Cratichneumon proximus* (Cresson)

19-III-18-IV-1972, D. Shaneck, G. Heinrich. **MISSISSIPPI.** Lafayette Co.: 2 females, Oxford (University collection). Oktibbeha Co.: Starkville, 3 females, 1 male, 5-IV-9-III, 6 males, 14-IX-30-X-1971, C. Sartor (University collection). Yalobusha Co.: 4 females, Water Valley, 11-VI-23-IX-1970-71, M. Horan. All specimens in CGH II unless otherwise noted.

4. *Cratichneumon tyloidifer* Heinrich Map 60

Cratichneumon tyloidifer Heinrich, 1961: 115, male.

Holotype: male, Michigan; CGH II.

SYSTEMATICS: This species, the 3rd of the *sublatus* group, is, within that group uniquely distinguished in males by a row of unusually broad, longish-oval tyloids, equal in size and shape to those of *variegatus* (Provancher). Another distinctive character of *tyloidifer* male is the strongly concave clypeus, which also approaches that of *variegatus*. The species is widely distributed and not rare; nevertheless the search for the associated female remained unsuccessful for more than 10 years.

Males of *tyloidifer* were the only representatives of the *sublatus* group found in a certain restricted area in central Tennessee during June 1972; this seemed to provide an excellent opportunity to find the associated other sex; the female collected at last in that area matches *tyloidifer* males perfectly, but I

am not able to distinguish it morphologically from the female of *pilosus* (Provancher). The area superomedia is large and markedly wider than long and the apical 1/3 of scutellum is white; these are the only differences I can find from a specimen of *pilosus* compared with the type. The male associated by Heinrich (1961) with *pilosus* also matches the female (from Tennessee) very well, but is without doubt specifically different from *tyloidifer*, as well as from all other males of the *sublatus* group. There is no conclusive explanation for the puzzling problem; the case should be kept under continuing observation.

MALE: Length 15-17 mm. Black, the following white: mandible base, face and clypeus uniformly, orbits around eyes (narrowly interrupted at vertex and at malar space), collare, pronotal ridge, subalarum, tegulae entirely or in part, scutellum, postscutellum, marks on propodeum, at least covering apices of areae dentiparae and parts of areae posteroexternae (rarely extending over parts of the areae superomedia, postero-media, and spiraculiferae), sometimes mark on carinal triangle, exceptionally a median mark on mesoscutum, latero-apical marks on postpetiole, coxae I and II except basally, large mark on dorsal side of coxae III, usually marks on ventral side of 1st trochanters I and II, femora I and II apically on interior side, tibiae I and II and segments 1-3 of tarsi I and II on dorsal side, a dorsal stripe on tibiae III beyond their base (usually extending over 2/3 of length of tibiae and sometimes reaching to their extreme base), sometimes dorsal side of metatarsi III; abdomen black; flagellum with complete white annulus on segments 14 or 15 or 16 to 21 or 22 or 24; scape ventrally ivory.

FLAGELLUM: With 40 segments and with longish-oval, very large tyloids on segments 5 or 6 to 16 or 17, the largest and longest on segments 8-14 covering the entire length of these segments and forming a continuous row.

HEAD: Temple profile moderately narrowed behind eyes, curved; malar space 1/3 as long as width of mandible base; clypeus medially rather strongly concave, its apical border medially a little projecting; median field of face strongly protruding toward upper end, its lateral, longitudinal impression pronounced and diverging above; lower part of facial orbits somewhat prominent; eyes bulging; carina oralis markedly raised.

THORAX: Anterior 1/3 of notauli distinct; scutellum distinctly raised above postscutellum, with steep apical slope; area superomedia large, markedly wider than long, with costulae before middle, slightly narrowed from costulae toward basal furrow of propodeum; area basalis deepened; mesolcus crenulate.

LEGS: Rather slender; femora III more than 5 times as long as medially wide in lateral view.

ABDOMEN: Postpetiole with fairly distinct median field, very finely coriaceous rugose; 2nd tergite distinctly and densely punctured, the 3rd tergite with shallow and finer puncturation to beyond middle, both tergites very finely coriaceous between punctures.

FEMALE: (tentative). Length 13-14 mm. Equal in structure and color to *pilosus* (Provancher), except for the white apical third of scutellum and transverse area superomedia. Black, the following white: frontal orbits narrowly, apical 1/3 of scutellum, sometimes mark on collare, small apical mark on pronotal ridge, mark on subalarum, always dorsal mark on all tibiae beyond base; flagellum with white annulus.

DISTRIBUTION (map 60): From Maine, Ontario, and Michigan south to Tennessee and Arkansas. ARKANSAS. Garland Co.: 2 males, Ouachita State Park, 14-23-V-1972, G. Heinrich, D. Shaneck. TENNESSEE. Hen-



Map 60. *Cratichneumon tyloidifer* Heinrich

derson Co.: 1 female, 6 males, Natchez Trail State Park, 1-13-VI-1972, G. Heinrich, D. Shaneck.

**5a. *Cratichneumon variegatus*
variegatus (Provancher)**

Ischnus variegatus Provancher, 1857b:250, male.

Cratichneumon w-album, Townes and Townes, 1951:289, male.

Cratichneumon variegatus, Heinrich, 1959d:190, male. Heinrich, 1959b:214, male. Heinrich, 1961:122-124, male, female.

Holotype: male, Quebec. Provincial Museum Quebec. No. 710. Neallotype: female, Maine, ex *Acronicta* sp., CGH II. (Designated by Heinrich, 1961).

SYSTEMATICS: A large, unmistakably distinguished species, in males by (1) a strongly concave, "dish-shaped" clypeus, (2) unusually large, broadly-oval tyloids, (3) uniformly fulvous tibiae III without yellow and black pattern (except sometimes basally very narrowly black tibiae III). Females are particularly characterized by the structure of flagellum, which is lanceolate, ventrally flattened and strongly widened beyond middle, markedly attenuated toward apex; in addition females are distinguished by (corresponding with male) the almost uniformly fulvous tibiae III, always without yellow pattern.

FEMALE: Length 14-15 mm. Basic color of head and thorax black (mesoscutum never partially red) with white pattern extending to be more or less strongly reduced as compared with other subspecies; abdomen orange ferruginous, the 1st tergite usually basally more or less extensively black, apically sometimes white marked; coxae and trochanters white and ferruginous orange, the coxae III partially black; femora, tibiae, and tarsi almost uniformly orange ferruginous, tibiae never yellow marked; tarsi usually yellowish tinged toward apices; the following are always white: rounded median mark on mesoscutum, collare, subalarum, pronotal ridge, pronotal base partially or entirely, scutellum, postscutellum, w-shaped mark on propodeum (covering areae basalis superomedia, posteroexternae, spiraculiferae, and upper part of area posteromedia, all predominantly or entirely), carinal triangle; mesopleura usually (as in neallotype) entirely black; white markings on face reduced, white band on outer orbits interrupted or absent, clypeus and cheeks partially to predominantly white; sterna always uniformly black; flagellum with complete white

annulus on segments 8-16 or 18; on the average slightly smaller than the following subspecies, with temples and cheeks a trifle less convex.

FLAGELLUM: Stout, lanceolate, strongly widened beyond middle, markedly attenuated toward apex, with 37-41 segments, the 1st about 1.5 times as long as wide, the 5th square, the widest about 2 1/2 times as wide as long.

HEAD: Temple profile barely to not at all narrowed behind eyes, cheek profile more or less distinctly narrowed toward mandibles, the former always curved, the latter nearly straight to moderately curved; cheeks in lateral view very wide and strongly convex, shiny, with a few scattered punctures; clypeus slightly depressed, completely flat; median field and lateral fields of face somewhat protruding; frons strongly concave.

THORAX: Mesoscutum longer than wide, moderately convex, shiny, with scattered punctures; anterior 1/3 of notauli distinct; carination of propodeum complete and strong; area superomedia usually longer than wide, with costulae somewhat before middle, slightly narrowed toward area basalis, sometimes not clearly separated from the latter; mesopleura very coarsely punctured, the punctures tending to run into irregular, longitudinal striae; sternauli on the mesosternum rather distinct.

LEGS: Stout; femora III about 3 times as long as medially wide; coxae III with fairly strong, fulvous scopa, and with moderately coarse, sparse puncturation.

ABDOMEN: Somewhat elongate, gradually narrowed toward apex; postpetiole nearly smooth, with extremely fine, coriaceous sculpture, and with usually a few scattered punctures; 2nd tergite also extremely finely coriaceous, with dense and fine puncturation, except apically; gastrocoeli subobsolete, thyridia fairly distinct.

MALE: Length 16-19 mm. Head white, except black antennal cavity, middle of frons, ocellar and occipital regions; basic color of thorax black with white pattern generally corresponding with that of female, but prosternum white except black base and mesosternum uniformly white, together with most of mesopleura (except about the upper 1/3); **the pronotal base always entirely white;** (in contrast to female); very little individual or geographical variation in the distribution of white color on thorax; basic color of abdomen orange ferruginous, with blackish infuscations on anterior tergites less ex-

tensive and less distinct (sometimes barely indicated) than in following subspecies; 1st segment usually with white apical mark; legs corresponding in color with female; flagellum with complete white annulus on segments between 13 and 17 to 25, or 26 or 27; ventrally pale ochreous to (in Florida) black; scape ventrally white.

FLAGELLUM: With 38-44 segments and with unusually large, oval tyloids on segments 6 or 7 to 16 or 17, the 1st and last ones minute, the longest on segments (about) 9-14 reaching from bases to apices of segments and being little less than 1/2 as wide as long.

HEAD: Temple profile only slightly narrowed behind eyes, strongly curved; malar space subobsolete, its length a fraction of the width of mandible base; clypeus strongly concave as a whole, dish shaped, the anterior border medially a trifle prominent; median field of face very sharply prominent, sloping down on both sides into a deep, longitudinal depression in the lateral field, which again raises on its outer side toward the orbits, forming a slightly elevated ridge along eye; eyes strongly bulging.

DISTRIBUTION: Southeastern Canada and northeastern United States, south probably to northern New York.

HOSTS: In Ontario reared from *Dryocampa rubicunda* (Fabricius) (along with long series of *Cratichneumon anisotae* Heinrich) (CNC); in Maine reared from *Acrionicta* sp. on beech (CGH II); 1 female from *Heterocampa guttivitta* (Walker) (USNM).

5b. *Cratichneumon variegatus insignitus* Heinrich Map 61

Cratichneumon variegatus insignitus Heinrich, 1971:985, female, male.

Holotype: female, Georgia; CGH II. Allotype: male, Georgia; CGH II.

SYSTEMATICS: Both sexes of this subspecies differ from the nominate form slightly in structure by a trifle wider and more curved temple profile and cheek profile; females differ in color markedly by much more extensive white markings, particularly on the mesopleura, while males are distinguished by greater extent and deeper shade of black markings on nearly all tergites, and by denser and slightly coarser puncturation of tergites 2 and 3.

The northern border of the range between this subspecies and the nominate form is not

clearly established; most likely there will not be a clear-cut limit to the north, but a zone of transition.

FEMALE: Mesopleura with conspicuous white band which runs almost diagonal from the posterior lower corner of mesopleura to the anterior upper corner; white band on orbits continues from vertex and temple along the hind margin of eye to, or almost to mandible base, widening below over most of the surface of cheeks; area superomedia and areae spiraculiferae always uniformly white, as are also coxae and trochanters I and II.

MALE: Agrees with the nominate form generally in the distribution of white and in the black color of the 1st abdominal segment with white sides, and the extensively white-marked median field of the postpetiole; the black markings on the following tergites, however, are distinctly more extensive and more intensive than in the nominate form; tergite 2-4, usually also the 5th tergite, and sometimes even the 6th with apically bipartite and ill-defined, wide, longitudinal blackish bands which, on the 2nd tergite extend close to its apical border and decrease in length and depth of color gradually from tergite to tergite.

DISTRIBUTION (map 61): North Carolina south to northern Florida, west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 10-15-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 5 males, 1 female, Gold Head Branch State



Map 61. *Cratichneumon variegatus insignitus* Heinrich

Park, 25-IV-5-VII-1971-1972, D. Radtke. GEORGIA. Clarke Co.: 2 males, Athens, 1-VI-11-VIII-1969, R. Duffield. Monroe Co.: 6 females, 8 males, Forsyth, 20-V-31-X-1968-1971, G. Heinrich, F. Naumann. LOUISIANA. Avoyelles Co.: 15 males, 1 female, Eola, 13-IV-15-VI-1972, D. Shaneck. Evangeline Co.: 9 females, 57 males, Bayou Chicot, 24-V-30-XI-1971 (all months inclusive), D. Shaneck; 4 females, 33 males, Chicot State Park, 15-VI-28-VII-1971, G. Heinrich, D. Shaneck. Natchitoches Co.: 1 female, 1 male, Powhatan, 11-18-VI-1971, G. Heinrich. Webster Co.: 2 females, 7 males, Bistineau State Park, 15-IV-5-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 1 male, Starkville, 14-20-VII-1970, C. Sartor. Yalobusha Co.: Water Valley, 11 females, 7 males, 29-IX-23-XI-1970, 5 females, 37 males, 11-V-26-IX-1971, M. Horan. TENNESSEE. Henderson Co.: 2 females, 2 males, Natchez Trail State Park, 1-25-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

5c. *Cratichneumon variegatus fuscovariegator*, new subspecies
Fig. 33-34, Map 62

SYSTEMATICS: This is an endemic form, seemingly confined to the central part of Florida. Females are strikingly distinguished from all *variegatus* populations of the North American Continent by extensively black-banded tergites 2-4; the black pattern of the abdomen of males is analogous to the pattern of the subspecies *insignitus* from the southeastern states, but on the average still more extensive, and darker; males are, in addition, characterized by (1) ventrally black (instead of pale orange) flagellum and (2) laterally partially or entirely black petiole. As in subspecies *insignitus*, the cheeks of males are slightly more convex than in the nominate form, making the temple profile in the vertical view a little wider and a trifle more convex.

FEMALE: Length 15 mm. Head white, except the following parts black: small mark above each side of clypeus, antennal cavity broadly, middle of frons narrowly, ocellar, occipital, and posterior temple regions

together with hind margin of cheeks; thorax black, the following white: collare, pronotal ridge, lower end of pronotal base, subalarum, tegulae, large median mark on mesoscutum, scutella, broad diagonal bands on mesopleura (running from upper anterior to lower posterior part), carinal triangle, and w-pattern on propodeum, the latter does not include the area superomedia (except its apical margin); legs fulvous, all coxae and trochanters yellowish white, exterior side of coxae III and, in lesser extent, their interior side, black; abdomen fulvous, the following blackish: 1st segment, except apical whitish mark on median field of postpetiole, 2nd tergite, except about apical 1/3, about basal 1/3 of 3rd tergite, and narrow base of 4th tergite; tarsi pale yellow.

FLAGELLUM: With 39 segments. Segments 1-7 uniformly deep black, complete white annulus on segments 8-19, the following ventrally brownish; scape ventrally light ferruginous.

MALE: Length 17-20 mm. Color of head (fig. 34) as in female, except that the 2 black marks on face are absent; white dorsal pattern on thorax as in female; white are: prosternum except base, mesosternum entirely, mesopleura predominantly, exterior belt of prepectus, pronotal base entirely, and apical part of metapleura; anterior 1/3 or 2/3 of area superomedia always black; legs fulvous, without black or infuscated parts, except more or less extensively black exterior and anterior side of coxae III; all trochanters, coxae I and II and basic color of coxae III white; tarsi pale yellow; basic color of abdomen fulvous, all tergites (except the 7th) basally, in a gradually decreasing extent from tergite to tergite, black or blackish infuscated, tergites 1-3 predominantly black; median field of postpetiole apically and the sides of petiole apically, more or less extensively white; flagellum black, with complete white annulus on segments 13 or 14, or 16, or 17 to 25, 26, or 27; ventrally black, or, sometimes, black brown; scape ventrally white.

FLAGELLUM (Fig. 33): With 38-44 segments.

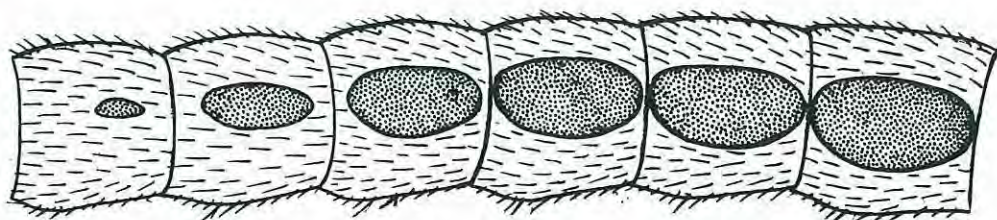


Fig. 33. *Cratichneumon variegatus fuscovariegator* Heinrich (male). Tyloids of flagellar segments 10-15.

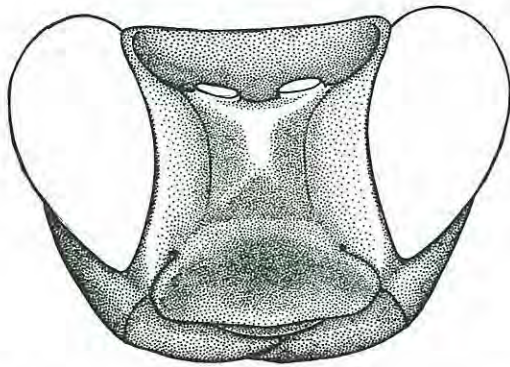


Fig. 34. *Cratichneumon variegatus fuscovariiegator* Heinrich (male). Head, frontal view.

Holotype: female, Florida, Highlands Co., Lake Placid, Archbold Biological Station, 21-IV-1968, G. Heinrich. Allotype: male, same data except 20-IV-1968. Paratypes: 30 males, same locality, 18-II-20-IV-1967-1968; Highlands Co.: Highlands Hammock State Park, 13 males, 25-28-V-1968, 3 females, 2-14-VIII-1969, G. Heinrich, D. Radtke; 1 female, 9-15-IX-1969, R. Miller. All specimens in CGH II.

DISTRIBUTION (map 62): Central Florida. In addition to the above, I have seen the following specimens: 4 males, same data as holotype, 10-14-VIII-1969, G. Heinrich; Highlands Hammock State Park, 8 males, 2-31-VIII-1969, G. Heinrich, D. Radtke, 4 males, 1-24-IX-1969, R. Miller. All in CGH II.



Map 62. *Cratichneumon variegatus fuscovariiegator* n. subsp.

6. *Cratichneumon anisotae* Heinrich Fig. 35-37, Map 63

Cratichneumon anisotae Heinrich, 1961:119-122, female, male.

Holotype: female, Sandfield, Ontario; ex *Anisota rubicunda* Fabricius. CNC (No. 7014). Allotype: male, Ontario; CNC.

SYSTEMATICS: In size and general appearance similar to *variegatus* (Provancher); differing decisively in males by (1) considerably wider and extremely large tyloids of about equal length and width (fig. 37); (2) strongly crenulate mesolcus; (3) clypeus not "dish shaped," i.e. not strongly concave on its whole surface but with a restricted concave median area only (fig. 35); (4) tibiae III always with a narrow, basal black band and with a yellow area on dorsal side behind black base. Females are distinguished by: (1) subfiliform flagellum, only slightly attenuated toward apex; (2) absent or rather indistinct scopa; (3) tibiae III, as a rule, with a dorsal yellowish mark behind base; (4) areae spiraculiferae never included in white pattern of propodeum.

Canadian populations show a white median mark on the mesoscutum in females only in 50% of the specimens (Heinrich, 1961); in southeastern populations this mark is constantly present. In Canadian males the mesosternum often is partially to entirely black, in southeastern males always completely white. The subtle and inconstant differences do not warrant subspecific distinction.

FEMALE: Length 12-15 mm. Head and thorax black; the following white: orbits around eyes (always interrupted on malar space, narrowed on vertex, usually widened on cheeks), upper part of median field of face, base of mandibles, collare, pronotal ridge, usually lower end of pronotal base, sub-

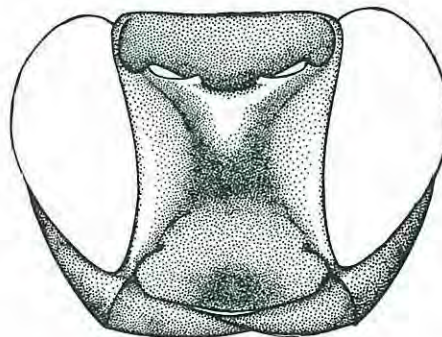


Fig. 35. *Cratichneumon anisotae* Heinrich (male). Head, frontal view.

alarum, scutellum, postscutellum, in southern populations always, in northern usually a median mark on mesoscutum, carinal triangle in part, always areae postero-externae, often upper part of area postero-media, in southern specimens often also area superomedia partially to entirely, 1st trochanters I and II and coxae I and II dorsally more or less extensively, large mark on dorsal side of coxae III (extending from base of outer side to apex of inner side), in southern specimens often a more or less indistinct mark on apex of median field of postpetiole, and (in southern populations always, in northern often) a mark beyond base on dorsal side of all tibiae; tegulae and clypeus always ferruginous, median field of face and lower outer orbits varying in northern populations from white to ferruginous; abdomen and legs including coxae, ferruginous, except more or less extensively black petiole and exterior as well as part of anterior side of coxae III and often blackish extreme base of tibiae III; flagellum black, with complete white annulus on segments 8 or 10 to 16 or 17 or 18; brownish on ventral side beyond annulus, segments before annulus apically brownish; scape ventrally light ferruginous.

FLAGELLUM: Subfiliform, slightly widened beyond middle and slightly attenuated at apex, with 36-38 segments, the 1st about 1.5 times as long as wide, the 5th or 6th in lateral view square, the widest on the flat side 1.5 to nearly 2 times as wide as long.

HEAD: Temple profile broad, not tangibly narrowed behind eyes, curved; cheek profile not narrowed toward mandible base, outline of head in front view almost square; malar space about 1/3 as long as width of mandible base; cheeks in lateral view very wide, strongly convex; eyes in contrast to *variegatus* not bulging; clypeus flat, short, and fully 4 times as wide as medially long; median field of face and lateral fields above clypeal foveae distinctly protruding; upper frons not concave.

THORAX: Mesoscutum somewhat longer than medially wide, rather flat, glossy, with sparse, coarse puncturation; about anterior

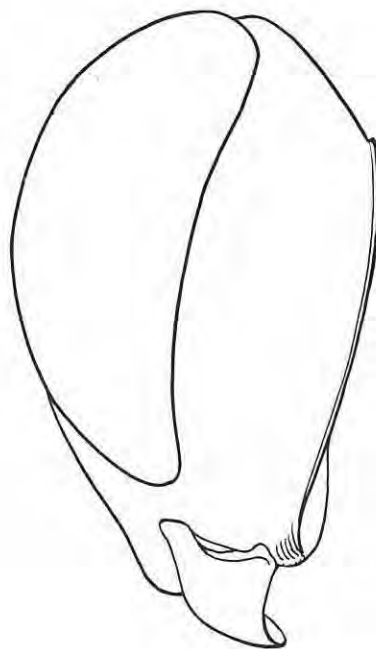


Fig. 36. *Cratichneumon anisotae* Heinrich (male). Head, lateral view.

1/4 of notauli fairly distinct; carination of propodeum strong and complete; area superomedia hexagonal, usually somewhat longer than wide, with costulae before middle, clearly separated in front from area basalis, and slightly narrowed from costulae toward the area basalis; mesopleura very densely and coarsely rugose punctate, except more finely sculptured speculum.

LEGS: Short and stout, femora III about 3.5 times as long as medially wide in lateral view; coxae III on ventral side with scattered, coarse punctures, shiny, with extremely fine, coriaceous undersculpture, apically on inner side with moderately dense hairs, not forming a distinct scopa; tibiae I and II strongly spinose on dorsal side.

ABDOMEN: Postpetiole with extremely fine, coriaceous sculpture, almost smooth, usually with a few scattered punctures at base or near apex; 2nd tergite densely and very finely

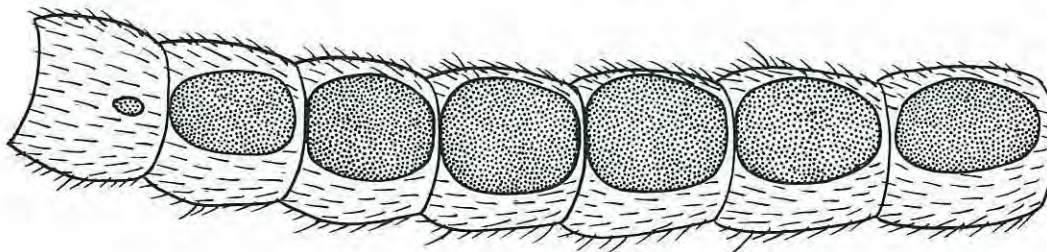


Fig. 37. *Cratichneumon anisotae* Heinrich (male). Tyloids of flagellar segments 9-15.

punctured, except apically, alutaceous between punctures; gastrocoeli obsolete, thyridia recognizable; the following tergites alutaceous, without punctures.

MALE: Length 15-18 mm. Head (fig. 35, 36) white, with the following black parts: antennal cavity broadly, middle of frons narrowly, ocellar and occipital regions together with posterior part of temples and cheeks along carina genalis, and mark on malar space; thorax black, the following white: collare, pronotal ridge and base, tegulae, subalarum, large median mark on mesoscutum, scutellum, postscutellum, w-pattern on propodeum (covering area supero-media entirely or partially, sometimes part of area basalis, area posteromedia entirely or except apical part, areae superoexternae, areae spiraculiferae, and apical marks on areae metapleurales), carinal triangle, prosternum except base, exterior belt of prepectus, more than lower 1/2 of mesopleura, usually almost entire mesosternum or at least part of it (in northern populations sometimes mesosternum black); all femora orange ferruginous; basic color of all coxae and trochanters white, the coxae III on interior and exterior side, 1st trochanters III on dorsal side more or less extensively black; tibiae and tarsi I and II yellowish, the former on ventral side blackish infuscated; tibiae III basally always narrowly black or blackish, narrowly yellow or yellowish behind black base, ferruginous or dorsally blackish infuscated behind yellow section; tarsi III varying in color from pale yellowish (in some southern specimens) to blackish (in northern and some southern specimens); basic color of abdomen light ferruginous; 1st abdominal segment black, with white sides and large apical white mark on median field of postpetiole; tergites 2-6 without or (usually) with blackish infuscations in the shape of 2 longitudinal bands on the 2nd and a mark on each side of the disc of the 3rd and the following tergites; these infuscations vary in shade from barely recognizable to deep black and also in extent; flagellum black, with complete white annulus in segments 16-23 or 24, ventrally pale ochreous, scape ventrally white.

FLAGELLUM: Nodose, with 40-42 segments and with extraordinary-shaped tyloids (fig. 37) on segments 5 or 6 to 15; tyloids on segments 5 or 6 to 8 narrow and elongate, on segments 9 to 14 enormously widened, nearly as wide as long, on the 15th usually somewhat smaller than on the preceding segments.

HEAD: Temple profile scarcely narrowed behind eyes, with distinctly curved outline; malar space subobsolete; eyes not bulging; clypeus medially only slightly concave, not nearly as strongly and extensively as in *variegatus*; median field of face strongly prominent, but distinctly less so than in *variegatus*.

DISTRIBUTION (map 63): Ontario, Quebec, and Maine, west to Michigan, south to northern Florida and to Louisiana. ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 12-17-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Hamilton Co.: 1 male, Jasper, 16-IV-1971, G. Heinrich. Liberty Co.: 1 male, Torreya State Park, 11-V-1968, G. Heinrich. LOUISIANA. Webster Co.: 12 females, 5 males, Bistineau State Park, 14-IV-4-V-1972, G. Heinrich. All specimens in CGH II.

HOSTS: *Dryocampa rubicunda* (Fabricius) (numerous records from Ontario; see Heinrich, 1961) and *Anisota senatoria* (J. E. Smith) (Hitchcock, 1961).

7. *Cratichneumon georgius* Heinrich Map 64

Cratichneumon georgius Heinrich, 1971:995-996, female.

Holotype: female, Georgia, CGH II. Neallotype: male, Forsyth, Monroe Co., Georgia, -14-V-1971. CGH II (present designation).

SYSTEMATICS: Rather large species, in size and appearance very similar to *variegatus* (Provancher) and *anisotae* Heinrich,



Map 63. *Cratichneumon anisotae* Heinrich

but by the structure of flagellum and presence of a distinct scopa on coxae III more closely related to the former than to the latter. Females are chromatically distinguished from both species by more or less extensively (sometimes entirely) red basic color of mesoscutum and head; from *variegatus* particularly by constantly yellow-marked tibiae I-III on dorsal side beyond base. Males are very similar to *variegatus* but readily recognizable by the following characters: (1) clypeus not "dish shaped" but only very slightly concave; (2) carina oralis at carinal junction (at the base of mandible) markedly, lamelliformly raised; (3) tyloids, though similar in shape, more elongate and longer as compared to their width; (4) anterior tergites only exceptionally with infuscated marks, and if so, at the most on tergites 2 and 3 only and in the shape of rather restricted blotches; (5) tibiae III always with a more or less extensive, yellowish section beyond base.

FEMALE: Length 14-16 mm. Head ferruginous red, with orbits broadly ivory, usually almost all around eyes (except only malar space and rarely also except lower outer orbits); ivory are also: mark on mandible base and sometimes median field of face and sides of clypeus; the following parts of head are black: antennal cavities, ocellar and occipital regions; frons (between antennal cavities and ocellar region) never black; basic color of thorax black, the mesoscutum at least medially (around median ivory mark) usually predominantly to entirely ferruginous red; the following parts of thorax always ivory: collare, pronotal ridge, subalarum, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, and areae posteroexternae; sometimes ivory are: uppermost part of area posteromedia, apical part of area superomedia, mark on tegulae, and apical mark on pronotal base; the following ferruginous: tegulae, area superomedia at least in part, the areae spiraculiferae, and median section of pronotal base; sometimes ferruginous are the exterior belt and surrounding carinae of areae superoexternae and dentiparae; lower part of area posteromedia ferruginous to blackish; abdomen always uniformly ferruginous red, including entire 1st segment; legs ferruginous red, the following ivory: dorsal side of all trochanters, dorsal marks on coxae I and II, large dorsal mark on coxae III, dorsal marks on all tibiae beyond bases, all tarsi; flagellum black, with complete white annulus on segments 7 or 8 to 16 or 17 or 18, ventrally brown beyond annulus; scape ventrally ferruginous.

FLAGELLUM: Subbristle shaped, moderately long, markedly widened beyond middle, and moderately attenuated toward apex; with 36-40 segments, the 1st 1.5 times as long as apically wide, the 6th or 7th in lateral view square, the widest on the flat side fully twice as wide as long.

HEAD: Structure as in *variegatus insignitus* Heinrich; the temple profile not narrowed behind eyes, the cheek profile only slightly narrowed toward mandible base, both curved; median field of face and lateral fields of face markedly protruding; malar space somewhat shorter than width of mandible base; frons slightly concave.

THORAX: Mesoscutum longer than wide, moderately convex, with coarse and sparse puncturation; anterior 1/3 of notauli distinct; carination of propodeum complete and distinct; area superomedia hexagonal, somewhat longer than wide, with costulae before middle, narrowed from costulae toward area basalis.

LEGS: Stout; femora III about 3 times as long as medially wide; coxae III with distinct scopa.

ABDOMEN: Sculpture of postpetiole and 2nd tergite extremely finely coriaceous, the former usually with a few scattered punctures, the latter finely and fairly densely punctured to beyond middle; gastrocoeli obsolete, thyridia fairly distinct.

MALE: Length 15-17 mm. White pattern on head, thorax, and 1st abdominal segment almost identical with *variegatus insignitus*; head white, the following black: antennal cavity broadly, middle of frons narrowly, ocellar and occipital regions, usually a small mark on malar space; basic color of thorax black, with extremely rich white pattern; the following white: collare, pronotal ridge and base entirely, subalarum, tegulae, large median mark on mesoscutum, scutellum, postscutellum, carinal triangle, extensive w-pattern on propodeum (including area superomedia, almost entire area posteromedia, areae posteroexternae, areae spiraculiferae, apical mark on areae metapleurales, and sometimes also area basalis), prosternum (except extreme base), broad exterior belt of prepectus, usually almost entire mesosternum, except some irregular apical black marks in the middle and before base of coxae II (in rare variations mesosternum nearly entirely black), and more than lower half of mesopleura; all coxae and trochanters ivory; coxae III with at least a black apical spot on dorsal side and black basal patch on interior side, their exterior side more or less

extensively ferruginous or black, or black and ferruginous; all femora orange ferruginous, except ivory tip of femora I and II; tibiae III orange ferruginous, blackish infuscated at extreme base, with an ill-defined ivory section beyond infuscation; all tarsi ivory, the tibiae I and II ivory, ventrally slightly infuscated; abdomen orange ferruginous, the petiole at least ventrally, often also dorsally more or less extensively blackish infuscated, laterally ivory, the postpetiole with large, apical, ivory mark; exceptionally the 2nd or 2nd and 3rd tergites each with 2 infuscated marks; flagellum black, with complete, white annulus on segments 15 or 16 or 17 to 23 or 25 or 27, ventrally black to brown.

FLAGELLUM: With 41-44 segments and with elongate, elliptic, fairly-wide (but distinctly less wide than in *variegatus*) tyloids on segments 5 or 6 to 17; the tyloids on the 5th and 6th segments indistinct, very narrow, bacilliform, the following gradually increasing in width and length from bases to apices of segments or almost so, the following segments gradually decreasing in size.

HEAD: Temple profile strongly curved, barely narrowed behind eyes; malar space subobsolete; clypeus not markedly concave as a whole, but only slightly depressed, particularly toward middle, and more densely punctured than in *variegatus*; median field of face less strongly raised and longitudinal depression on its sides less strongly deepened than in *variegatus*; carina oralis at the posterior corner of mandible strongly raised and lamelliform.

DISTRIBUTION (map 64): Georgia, west to Louisiana and Arkansas, north to Tennessee; 1 female from Rhode Island (CGH II). ARKANSAS. Garland Co.: 13 females, 2 males, Ouachita State Park, 14-27-V-1972, G. Heinrich. GEORGIA. Monroe Co.: 2 females, 1 male, Forsyth, 5-V-4-VI-1968, G. Heinrich. LOUISIANA. Evangeline Co.: 3 females, 18 males, Bayou Chicot, 20-III-27-X-1971-1972 (all months inclusive), G. Heinrich, D. Shaneck. Natchitoches Co.: 1 male, Natchitoches, 18-VI-1971, G. Heinrich; 1 female, 6 males, Powhatan, 11-25-VI-1971, G. Heinrich. Webster Co.: 1 female, 4 males, Bistineau State Park, 15-30-VI-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Yalobusha Co.: 1 female, 2 males, Water Valley, 6-V-31-VIII-1970-1971, M. Horan. TENNESSEE, Henderson Co.: 1 female, Natchez Trail State Park, 2-9-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

8. *Cratichneumon pseudanisotae*

Heinrich

Map 65

Cratichneumon pseudanisotae Heinrich, 1961:133, female.

Cratichneumon valdefuscus Heinrich, 1972: 177-178, female, male; new synonymy.

Holotypes: *Cratichneumon pseudanisotae*, female, New York, and *Cratichneumon valdefuscus*, male, Florida; CGH II.

SYSTEMATICS: Very similar, as the preceding species, in size and appearance to *variegatus* (Provancher), particularly the males, but is nevertheless well distinguished and readily recognizable. Males share with the 2 southern subspecies of *variegatus* (*insignitus* Heinrich and particularly *fuscovariegator* Heinrich) the extensive infuscations of anterior or of most tergites, but a glance at the tyloids and the clypeus reveals the specific differences: the tyloids are much narrower, almost parallel sided (instead of broadly oval), the clypeus showing only a small apico-median depression (instead of being dish-shaped concave as a whole).

Females share with *variegatus* the lack of yellow marks on dorsal side of tibiae and the deep black basic color of head and thorax, but are distinguished in color by lack of white on clypeus, cheeks, mesopleura, pronotal base, and most of areae spiraculiferae and area



Map 64. *Cratichneumon georgius* Heinrich

superomedia, and by a black 1st segment with apical, white band; in structure distinguished by obviously quite different proportions of flagellar segments. Females are similar in color also to *vinnulus* (Cresson), *paraparatus* Heinrich, and *subfilatus* Heinrich; differ from *subfilatus* chromatically by the complete lack of yellow marks on tibiae and particularly by the constantly present ivory apical band on the postpetiole (never occurs in *subfilatus*); females differ from *paraparatus* by distinctly, though only moderately densely and moderately strongly punctured 2nd tergite, and also by more slender flagellum; from *vinnulus* by the presence of a very distinct scopa on coxae III.

FEMALE: Length 13-15 mm. Head and thorax deep black, without red markings (only mandibles except teeth and apical margin of clypeus ferruginous); white are only: small spots on upper end of facial orbits, usually mark on median field of face, upper part of frontal orbits broadly, band on temples and on vertical orbits, collare, pronotal ridge, subalarum, scutellum, post-scutellum, median mark on mesoscutum, areae posteroexternae together with apices of areae spiraculiferae, and carinal triangle; abdomen light ochreous, only 1st segment black with apical ivory band; femora and tibiae uniformly fulvous, without black or yellow (ivory) marks; tarsi yellowish tinged; coxae and trochanters fulvous, coxae III with large, dorsal, white mark, more or less extensively black on exterior side and on basal part of interior side; coxae and trochanters I and II a shade paler than coxae III; coxae I and II white marked on dorsal side; flagellum black, with complete white annulus on segments 8 or 9 to 16 or 18 or 20.

FLAGELLUM: Subfiliform, barely widened beyond middle, only a trifle tapering toward apex, with 35-41 segments, the 1st fully twice as long as apically wide, the 8th in lateral view square, the widest on the flat side barely wider than long.

HEAD: Structure similar to that of *variegatus insignitus*, but temple profile a trifle narrowed behind eyes (with curved outline), cheek profile distinctly stronger narrowed toward mandible, with almost straight outline; malar space longer, though not quite as long as width of mandible base; cheeks in lateral view less wide than in *variegatus*, distinctly convex, polished, with scattered punctures; median field and lateral fields of face only very slightly protruding.

THORAX: Mesoscutum distinctly longer than wide, moderately convex, with sparse

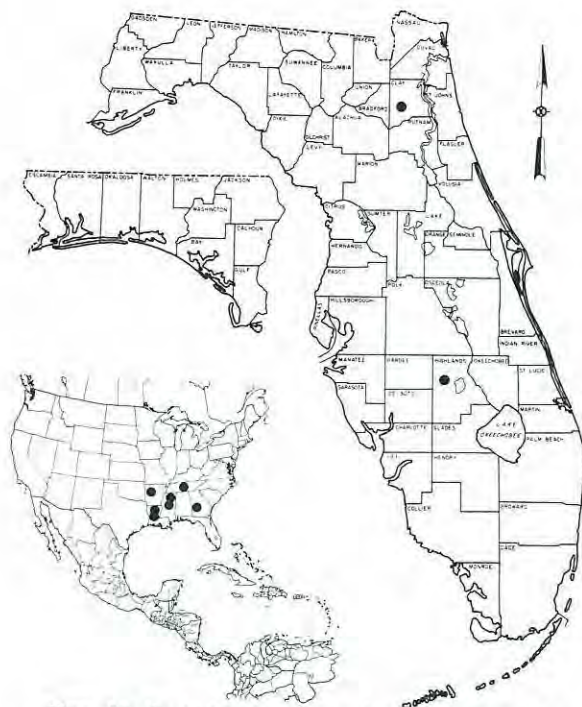
and coarse punctures, polished between punctures; anterior 1/3 of notauli distinct; carination of propodeum complete and distinct; area superomedia clearly shorter than in *variegatus*, about as long as wide, with costulae nearly in the middle, slightly narrowed from costulae toward area basalis; pleura coarsely and densely rugose punctate.

LEGS: Stout; coxae III with distinct scopa.

ABDOMEN: Postpetiole distinctly irregularly rugose, more finely sculptured toward apex; 2nd tergite finely coriaceous with moderately dense, fairly fine puncturation to beyond middle; the 3rd and the following tergites extremely finely coriaceous, without puncturation.

MALE: Length 12-17 mm. Head white, the following black: spot on malar space (together with narrow apical margin of cheeks), antennal cavities, middle of frons, ocellar and occipital regions; thorax dorsally black with extensive white markings; white are: collare, pronotal ridge and pronotal base, subalarum, tegulae, large median mark on mesoscutum, carinal triangle, extensive w-pattern on propodeum (covering entire areae spiraculiferae and posteroexternae together with adjacent apical marks on areae meta-pleurales, apical part of area superomedia, anterior margin of area posteromedia, and usually apices of areae dentiparae), prosternum except base, broad exterior belt of prepectus all around, mesosternum (usually except apical black margin and mark in front of coxae II), about lower 2/3 of mesopleura; all coxae white (except a large black patch on exterior side of coxae III, which apically extends on to their dorsal side and another large black mark on basal part of their inner side); all trochanters white, 1st trochanters III dorsally black marked, 2nd trochanters orange; all femora and tibiae orange, without black or yellow markings; all tarsi yellowish white; upper surface of abdomen predominantly black; postpetiole with apical ivory band and lateral surfaces, the following tergites (usually at least the 2nd and 3rd) with narrow apical and lateral fulvous or ivory-tinged margins; the extent of apical, fulvous bands gradually increasing from tergite to tergite; at least the last 2 tergites predominantly or entirely fulvous; flagellum black, with complete white annulus on segments 13 or 14 to 24 or 25, sometimes even to 29; scape ventrally white.

FLAGELLUM: With 37-43 segments, and with narrow, almost parallel sided, elongate tyloids on segments 5 or 6 or 7 to 14 or 17, the



Map 65. *Cratichneumon pseudanisotae* Heinrich
longest, on segments 7 or 8 to 12 or 13 almost reaching from bases to apices of segments.

HEAD: Temple profile moderately narrowed behind eyes, curved; malar space subobsolete; clypeus with distinct but not extensive apico-median depression, its thin apical margin medially somewhat projecting; median field of face rather strongly, and, toward the upper end, sharply protruding, bordered on each side, and below toward clypeus as well, by sharp, rather obtrusive depressions; the narrow lateral fields of face also somewhat protruding toward the lower ends.

DISTRIBUTION (map 65): Eastern U. S. from New York (Heinrich, 1972) south to Central Florida and west to Louisiana and Arkansas. **ARKANSAS.** Garland Co.: 1 male, Ouachita State Park, 12-17-V-1972, G. Heinrich, D. Shaneck. **FLORIDA.** Clay Co.: 2 males, Gold Head Branch State Park, 27-IV-1971, G. Heinrich, D. Radtke. Highlands Co.: 4 males, Highlands Hammock State Park, 13-VI-24-VII-1968-1971, G. Heinrich, D. Radtke. **GEORGIA.** Banks Co.: 1 male, Homer, 11-V-1970, G. Heinrich. Monroe Co.: 2 males, Forsyth, 20-30-V-1968 and 8-VII-1969, F. Naumann. **LOUISIANA.** Avoyelles Co.: 2 females, Eola, 26-III 22-VI-1972, D. Shaneck. Evangeline Co.: 1 female, 15 males, Bayou Chicot, 26-IV-27-X-1971, G. Heinrich, D. Shaneck. Webster Co.: 1 female, 2 males, Bistineau State Park, 17-22-IV-1972, G. Heinrich, D. Shaneck. **MISSISSIPPI.** Auder-

dale Co.: 1 male, Meridian, 29-VI-1970, G. Heinrich. Yalobusha Co.: 2 males, Water Valley, 11-V-5-VII-1970, M. Horan. **TENNESSEE.** Henderson Co.: 2 females, Natchez Trail State Park, 2-10-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

ECOLOGY: Ecologically restricted to patches of moist lowland forest with dense undergrowth. In the southeast apparently has 2 generations, with the 1st peak of frequency at the beginning of May, the 2nd during October.

9. *Cratichneumon subfilatus* Heinrich Map 66

Cratichneumon subfilatus Heinrich, 1961: 131-132, female, male.

Holotype: female, Quebec; CGH II. Allotype: male, Michigan; CGH II.

SYSTEMATICS: Females of this species share with *pseudanisotae* Heinrich and with *variegatus* (Provancher) the black basic color of the thorax and the constantly-present, conspicuous, median, white mark on the mesoscutum. They are, however, on the average considerably smaller than these 2 species and differ in color from them by, as a rule, distinct though fairly small ivory mark beyond base of tibiae III. Females are distinguished by a combination of the following characters: (1) flagellum subfiliform, fairly long, slender, barely widened beyond middle, and only slightly attenuated toward apex; (2) coxae III with distinct scopa; (3) temple profile slightly narrowed behind eyes, a trifle curved; cheek profile clearly narrowed toward mandible base, almost straight; (4) mesoscutum with conspicuous, median, ivory mark, vertical and temple orbits broadly ivory marked; (5) upper facial orbits ivory marked, as is often also the median field of face; (6) postpetiole never with apical ivory band. Particularly characteristic for the male is the color of tibiae III; they are orange, slightly reddish or brownish infuscated at extreme base and sometimes also at extreme apex, with a not clearly defined, yellowish area beyond base, shading gradually into orange toward the base of tibiae and toward the apex as well. The mesosternum is in typical specimens entirely or predominantly ivory, the area metapleuralis entirely or predominantly black.

FEMALE: Length 11-15 mm. Basic color of head black and ferruginous, the former color often prevailing in northern, the latter in southern populations; always ivory are: the upper frontal and temple orbits broadly and smaller marks on upper facial orbits; clypeus and median field of face ferruginous,

the latter often with ill-defined ivory mark or entirely ivory, the clypeus sometimes ivory tinged laterally; in 2 specimens from Louisiana outer orbits broadly ivory instead of ferruginous; basic color of thorax deep black, the following ivory: collare, pronotal ridge, apex and base of pronotal base (sometimes entire length of pronotal base), subalarum, scutellum, postscutellum, a conspicuous median mark on mesoscutum (usually surrounded by a ferruginous belt), carinal triangle, and the areae posteroexternae together with the ends of areae spiraculiferae; abdomen ferruginous, the petiole sometimes partially or entirely black; legs light ferruginous, including coxae, the coxae and trochanters I and II usually yellowish to partially ivory, the coxae III always with large ivory mark on dorsal side, sometimes black on exterior side and on base of inner side; femora, tibiae and tarsi orange ferruginous, the tibiae with small, more or less distinct, rarely obsolete (specimen from Florida) mark on dorsal side beyond base; flagellum black, with complete white annulus on segments 7 or 8 or 9 to 15 or 16 or 18, scape ventrally ferruginous, usually basal part of flagellum ventrally brownish.

FLAGELLUM: Subfiliform, slender and fairly long, not, to slightly widened beyond middle, slightly attenuated toward apex, with 33-36 (Florida specimen 31) segments, the 1st about twice as long as apically wide, in lateral view the 7th or 8th square, the widest on the flat side 1-1.5 times as wide as long.

HEAD: Temple profile slightly narrowed behind eyes, slightly curved; cheek profile markedly narrowed toward mandible base, with straight outline, fairly long; malar space about as long as width of mandible base; carina oralis distinctly though not strongly raised at mandible base; cheeks in lateral view moderately wide, but barely convex; median field of face distinctly protruding; frons slightly concave; eyes a trifle bulging (in contrast to *w-album*).

THORAX: Mesoscutum only slightly convex, with rather sparse punctation, glossy; notauli basally distinct; mesopleura rather coarsely and densely rugose punctate, the speculum finely punctured; carination of propodeum strong and complete, area superomedia and area basalis usually confluent.

LEGS: Femora III fairly stout; coxae III sparsely punctured, shiny between punctures, with distinct scopa.

ABDOMEN: Median field of postpetiole densely, irregularly rugose, except apically; 2nd tergite moderately finely and moderately densely punctured to beyond middle, apically, as are the following tergites, alutaceous and impunctate; gastrocoeli obsolete; thyridia fairly distinct.

MALE: Length 11-15 mm. Head white, the following black: antennal cavities, middle of frons, ocellar region, occipital region, a band all along carina genalis, and a small mark on malar space; thorax black, the following white: collare, pronotal ridge and base, subalarum, tegulae, median mark on mesoscutum, scutellum, postscutellum, prosternum except base, exterior belt of prepectus all around, mesosternum (except apical margin and mark before coxae II), about lower 1/2 of mesopleura, carinal triangle, and extensive w-pattern on propodeum (covering areae spiraculiferae, apical mark on areae metapleurales, area superomedia entirely or partially, upper part or all of area postero-media, and the areae posteroexternae); abdomen orange, postpetiole with apical yellowish band, the petiole usually dorsally and ventrally more or less extensively black; legs orange, the following white or yellowish: coxae and trochanters I and II entirely, 1st trochanters III at least dorsally, coxae III ventrally, large dorsal mark on coxae III, all tarsi, and the dorsal side of tibiae I and II; coxae III more or less extensively ferruginous or black, or ferruginous and black on exterior side and basally on interior side; tibiae III with ill-defined yellowish section beyond base which is shading gradually into orange toward base and apex of tibiae, the latter usually narrowly and slightly infuscated at the extreme base; rarely tibiae III blackish infuscated at base and apex; flagellum black, ventrally pale ochreous to brownish, with complete white annulus on segments 15 or 16 to 22 or 23; scape ventrally white.

FLAGELLUM: With 36-38 segments and with rather narrow, elongate oval, nearly bacilliform tyloids on segments 7-14 or 15, the longest reaching almost to bases, but not to apices of segments.

HEAD: Temple profile slightly narrowed behind eyes, slightly curved; frons a trifle concave; eyes somewhat bulging; clypeus with small, sometimes indistinct, apico-median depression; median field of face toward upper end fairly sharply projecting, the lateral, longitudinal depressions distinct, carina oralis at mandible base somewhat raised; malar space subobsolete.

THORAX: Anterior 1/3 of notauli distinct;

scutellum slightly convex; area superomedia usually wider than long.

ABDOMEN: Gastrocoeli subobsolete, indicated by irregularly-longitudinal rugosity, longer than wide; tergites 2 and 3 distinctly and fairly densely punctured.

VARIABILITY: The species shows a startling degree of variability in size and also some chromatic variability in both sexes. There are 2 females from Pennsylvania with dorsally black base and apex of tibiae III, and 2 extremely large females from Louisiana with broadly white outer orbits; the latter perhaps could represent a distinct species, but there are no confirmative structural differences. The individual chromatic variability is comparatively small in females; there are male specimens with basally and apically markedly infuscated tibiae III or with partially black mesosternum; but it is not certain whether such melanistic specimens really belong to this species.

DISTRIBUTION (map 66): From Quebec west to Michigan, south to Florida, Georgia, Mississippi, Louisiana, and Arkansas. **ARKANSAS.** Garland Co.: 6 females, Ouachita State Park, 1-25-V-1972, G. Heinrich, D. Shaneck. **FLORIDA.** Alachua Co.: 1 female, Gainesville, 3-V-1970, G. Heinrich. **GEORGIA.** Banks Co.: 12 males, Homer, 11-13-V-1970, G. Heinrich, R. Duffield. **Clarke Co.:** 1 female, 5 males, Athens, V-1969, 7-VIII-21-IX-1968-1970, G. Heinrich, F. Naumann.



Map 66. *Cratichneumon subfilatus* Heinrich

LOUISIANA. Evangeline Co.: 2 females, Bayou Chicot, 6-13-X-1971, D. Shaneck. **Natchitoches Co.:** 2 males, College Forest, 11-19-VI-1971, G. Heinrich, 1 male, Powhatan, 13-VI-1971, G. Heinrich. **Webster Co.:** 9 females, Bistineau State Park, 21-IV-5-V-1972, G. Heinrich, D. Shaneck. **MISSISSIPPI.** Oktibbeha Co.: 1 female, Starkville, 28-VIII-3-VIII-1970, C. Sartor. **Yalobusha Co.:** 4 females, 5 males, Water Valley, 27-V-9-XI-1970, 4-V-6-VII-1971, M. Horan. **TENNESSEE.** Henderson Co.: 2 females, Natchez Trail State Park, 3-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

10. *Cratichneumon austropiceipes* Heinrich Map 67

Cratichneumon austropiceipes Heinrich, 1971:992-994, female, male.

Holotype: female, Mississippi; CGH II. **Allotype:** male, Mississippi; CGH II.

SYSTEMATICS: This is a form of the *w-album* group which represents 1 of the most complex and problematic sections of the North American Ichneumoninae. The group contains numerous forms of minor size, the females of all of them with yellow-marked tibiae, distinctly punctured 2nd tergite, distinct scopa on coxae III, and filiform flagella. The degree of individual chromatic and geographical variation is high and the morphological differentiation of the species low, facts, which make the distinction and diagnosis of species very difficult.

The form treated below is evidently distinct, though very closely related to *w-album lobatus* var. 1. Heinrich (described from Maine). Females differ from the latter chromatically by extensively dark (blood-) red head and femora III and also in structure by (1) comparatively somewhat longer and more slender femora III and (2) by the somewhat less widened beyond middle flagellum.

Males are very similar in color pattern to *w-album*, but differ from that species by partially or entirely blackish-infuscated tarsi III and by a shorter row of markedly-smaller tyloids.

FEMALE: Length 10-12 mm. Head and thorax black, the former with dark (blood-) red frons, vertex, upper occipital region, temple orbits, and usually also cheeks, clypeus and parts of face; the following white: scutellum, collare, sometimes also subalarum and indistinctly apex of pronotal ridge and the postscutellum; mesoscutum sometimes with dark red median area;

abdomen red, except black petiole; coxae and trochanters black, more or less extensively variegated with dark red, coxae III partially dark red on ventral side and on dorsal side; all femora red, the femora III apically narrowly black; all tibiae black, on dorsal side with small yellow mark beyond base; all tarsi black; flagellum black, with nearly complete white annulus on segments 8-15; scape ventrally red.

FLAGELLUM: Filiform, fairly slender, barely widened beyond middle, a trifle tapering at apex, with 32-34 segments, the 1st nearly twice as long as apically wide, in lateral view the 7th square, the widest on the flat side only slightly wider than long.

HEAD: Temple profile scarcely narrowed behind eyes, curved; cheek profile only slightly narrowed toward mandible base, curved; malar space not quite as long as width of mandible base; cheeks in lateral view wide, convex, with coarse puncturation; face and clypeus coarsely and rather densely punctured, coriaceous between punctures; median field of face somewhat protruding.

THORAX: Mesoscutum coarsely and fairly densely punctured, shiny between punctures; notauli indicated at the base only; carination of propodeum complete; area superomedia about as long as wide, with costulae nearly in the middle; mesopleura very coarsely and densely rugose punctate.

LEGS: Moderately stout; coxae III on ventral side moderately densely and strongly punctured, with dark-gray scopa.

ABDOMEN: Median field of postpetiole ill defined, except apically, finely irregularly rugose, with a few scattered punctures; gastrocoeli superficial, thyridia distinct; 2nd tergite finely and moderately densely punctured; 3rd tergite alutaceous, with some extremely fine puncturation on basal part.

MALE: Length 13 mm. Head white, with black malar space, antennal cavities, broad middle of frons, and the ocellar and occipital regions; thorax black, the following white: median mark on mesoscutum, collare, pronotal ridge and base, subalarum, tegulae, scutellum, postscutellum, carinal triangle, w-pattern on propodeum (covering areae spiraculiferae, apical marks on areae metapleurales, areae posteroexternae, apical part of areae dentiparae, and partially or entirely the areae superomedia and posteromedia), prosternum except base, mesosternum except black apical margin, broad exterior belt of prepectus, and mesopleura except about upper hind 1/3 black; abdomen orange ferruginous, the 1st segment laterally and

apically white, the petiole dorsally and ventrally black; coxae and trochanters white, coxae III black on exterior side and on base of inner side, 1st trochanters III black dorsally at base; femora I and II pale orange, femora III red with black tip; tibiae I and II whitish, the tibiae ventrally infuscated; tibiae III dorsally black with ivory section beyond base, ventrally reddish except apically; tarsi III partially or entirely black or blackish; flagellum black, ventrally orange, with white annulus on segments 13-20.

FLAGELLUM: With 35-36 segments; with very short, narrowly-oval tyloids on segments 7-12 or 13, the 1st and last punctiform, the longest covering only median 1/2 of length of segments.

DISTRIBUTION (map 67): From Maine south to Georgia, west to Mississippi. GEORGIA. Banks Co.: 2 females, Homer, 11-13-V-1970, G. Heinrich. Monroe Co.: 1 female, 1 male, Forsyth, 21-VIII-31-X-1970, F. Naumann. LOUISIANA. Webster Co.: 2 males, 17-30-IV-1972, Bistineau State Park, 17-30-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Yalobusha Co.: 1 female, 1 male, Water Valley, 13-VIII-5-X-1970, M. Horan. All specimens in CGH II.

11a. *Cratichneumon w-album* *w-album* (Cresson)

Ischnus w-album Cresson, 1864:191, male.

Ichneumon signatipes Cresson, 1867:308, female.



Map 67. *Cratichneumon austropiceipes* Heinrich

Ichneumon oryxicornis Viereck, 1905:324, male.

Amblyteles duplicatiformis Viereck, 1917: 354, 360, male.

Cratichneumon w-album w-album, Heinrich, 1961:129, female, male.

Neotype: *Ischnus w-album*, male, Lake Mohonk, New Paltz, New York, 12-VI-1966; CGH II (present designation). Holotypes: *Ischnus w-album*, male, Pennsylvania; lost. *Ichneumon signatipes*, female, Pennsylvania; ANS. *Ichneumon oryxicornis*, male, Kansas; Kansas University, Lawrence. *Amblyteles duplicatiformis*, male, Connecticut; ANS.

SYSTEMATICS: For the discussion of the taxonomic history of this species see Heinrich, 1961:126-127.

This is 1 of the most common and most widely distributed species of the genus, highly variable chromatically, individually, and geographically. Together with 3 or 4 other, rather similar forms of likewise great variability, it represents a complex of considerable taxonomic problems. The wide range of this species, extending from eastern Canada to Georgia and Tennessee, is divided between the 3 subspecies treated below. It must be noted, however, that the chromatic characters of 1 subspecies are gradually changing into the characters of the next, and that specimens showing the characteristics of 1 subspecies sporadically occur throughout in the area of the neighboring 1.

Females of *w-album* are distinguished by the following structural characters: (1) Flagellum filiform, rather stout, with 32-33 segments, the 1st only 1.5 times as long as apically wide, the widest about 1.5 times as wide as long on the flat side, apically barely tapering. (2) Coxae III ventrally smooth, with sparse punctures and with distinct scopa. (3) Second tergite with distinct, though fine puncturation, at least on anterior part. (4) Temple profile barely narrowed, cheek profile only slightly narrowed behind eyes and toward mandibles respectively, both curved.

FEMALE: Length 11-13 mm. Head and thorax black, with obscure red markings. Legs, including coxae (except tibiae and tarsi III) predominantly red; pronotal ridge usually white, sometimes ferruginous; frontal and vertical orbits usually ferruginous,

the latter sometimes narrowly ivory; pronotal base black; propodeum black, sometimes with restricted reddish or whitish mark below apex of areae dentiparae; mesoscutum sometimes medially reddish, but never with distinct median white mark; abdomen red, only petiole black.

MALE: Length 12-15 mm. Head predominantly white; the following black: antennal cavities, middle of frons, ocellar and occipital regions, mark on malar space, mandible teeth, and upper part to entire length of carina genalis and sometimes adjacent stripe of cheeks more or less extensively; thorax black with rich white pattern, including often median mark on mesoscutum and part of or complete w-pattern on propodeum, always scutellum, collare and pronotal ridge, often also pronotal base and more or less extensive markings on mesopleura and prosternum; mesosternum usually predominantly black, varying geographically to predominantly white; coxae and trochanters I and II varying geographically from black to white; coxae III varying geographically from entirely black to red combined with black and white; femora varying from black to red; tibiae III always with conspicuous, ivory section beyond base, usually at least dorsally black at base and beyond ivory section; tibiae I and II ivory on dorsal side; all tarsi usually ivory, the tarsi III varying occasionally to black in northern populations; flagellum black, ventrally pale brownish, with white annulus.

FLAGELLUM: With narrow, elongate-oval (close to bacilliform) tyloids on segments 5 or 6 to 14 or 15, the longest reaching almost to the base but not quite to the apex of segments.

HEAD: Malar space subobsolete, barely 1/4 as long as width of mandible base; clypeus with a slight, medio-apical concavity; median field of face distinctly prominent, its lateral, longitudinal impressions distinct but not pronounced.

THORAX: Mesoscutum coarsely and rather densely punctured, the median lobe more densely than the lateral lobes; anterior 1/3 of notauli distinct; scutellum moderately convex, with gradually rounded apical slope, apically truncate; horizontal part of propodeum short, the area superomedia wider than long.

ABDOMEN: Postpetiole smooth and shiny; gastrocoeli narrow and elongate, indicated only by a few longitudinal rugae, the narrow thyridia indistinct and removed from base of 2nd tergite.

DISTRIBUTION: Massachusetts west to Michigan, south to Illinois, Indiana, and at least to Virginia; also Kansas (type *oryxicornis*).

11b. *Cratichneumon w-album lobatus* (Provancher)

Ichneumon lobatus Provancher, 1875a:23, 77, male.

Cratichneumon w-album lobatus, Heinrich, 1961:129-130, female, male.

Cratichneumon piceipes Heinrich, 1961:130, female, male. New synonymy.

Holotypes: *Ichneumon lobatus* Provancher, male, Quebec. Provincial Museum, Quebec, No. 646. *Cratichneumon piceipes* Heinrich, female, Maine. CGH II.

SYSTEMATICS: Renewed examination of the type series of *Cratichneumon piceipes* Heinrich, females, revealed that it contains 2 extremely similar species which can be distinguished only by the proportions of femora III and by very slight differences in the proportions of flagellar segments. One of the 2 species was found to be specifically identical with *austropiceipes* Heinrich (distinguished by the more slender femora III), described from the southeastern states. The other, more common form (with stouter femora III) is represented by the type specimen and can, in all probability, be considered an extremely melanistic mutation of *w-album lobatus*. The different shape of the tyloids of the males associated with *piceipes* in the original description, remains a problem; the solution could be, that these males do not belong to the form represented by the type of *piceipes*, but to the species *austropiceipes*, also contained in the type series and collected along with the holotype at the same locality.

FEMALE: Femora III, or all femora black, sometimes varying to red; coxae black or black and red in combination; tarsi usually infuscated or black; pronotal ridge and collare varying from black to partially ferruginous, rarely narrowly white; head entirely black, or partially ferruginous; rarely mesoscutum more or less extensively ferruginous.

MALE: White pattern on coxae reduced: coxae I and II usually black, only apically white, coxae III uniformly black; femora III black; tarsi III usually more or less infuscated to entirely black; mesopleura not white marked, white pattern on propodeum reduced or lacking. In var. 1., white on tibiae reduced to a small dorsal spot beyond base; otherwise,

femora, tibiae, and tarsi III uniformly deep black; femora sometimes varying to dark red.

DISTRIBUTION: Quebec, Ontario, northern Michigan, New England.

**11c. *Cratichneumon w-album fuscior* Heinrich, new status
Map 68**

Cratichneumon fuscior, Heinrich, 1971:996-997, female.

Holotype: female, Georgia; CGH II.

SYSTEMATICS: The holotype was the only specimen at hand at the time of the original description of *fuscior* Heinrich; I compared it with *georgius* Heinrich and found that a decisive difference occurs in the structure of the flagellum only. Recently 2 females have been collected in Tennessee; the series of 3 females convincingly suggests that *fuscior* must be considered as the most southern subspecies of *w-album* (Cresson); *fuscior* differs from the associated northern forms chromatically (as is the rule confirmed by so many other species and genera) by increased extent of the ivory or yellow markings. Females from Missouri and North Carolina do not have ivory marks on mesoscutum, middle of face, and on clypeus (face and clypeus being entirely ferruginous), but otherwise agree with the species described below.

A sympatric, matching male of *fuscior* has not been identified yet.

FEMALE: Length 12-14 mm. More extensively ivory marked than nominate form; frontal and particularly temple orbits broadly ivory; also ivory are: mark on upper facial orbits, ill-defined stripe on lower outer orbits, usually mark on median field of face, and a small median mark on mesoscutum (surrounded by reddish color); areae postero-externae ivory; sides of clypeus yellowish tinged; coxae III orange ferruginous, with large, dorsal ivory mark.

DISTRIBUTION (map 68): Northern Georgia and Tennessee, north at least to North Carolina and Missouri. GEORGIA. Banks Co.: 1 female, Homer, 10-V-1970, G. Heinrich. TENNESSEE. Henderson Co.: 2 females, Natchez Trail State Park, 6-28-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

**12. *Cratichneumon louisianae*,
new species
Map 69**

SYSTEMATICS: Without doubt a distinct form, though extremely similar to *w-album*



Map 68. *Cratichneumon w-album fuscior* Heinrich

w-album (Cresson); found so far only in a rather restricted area of central Louisiana. Females and males are much smaller in size than *w-album fuscior*, the neighboring subspecies of *w-album*, recorded from Georgia, Tennessee, North Carolina and Missouri. Females are lacking the extensive ivory markings on head and coxae III (so characteristic for *w-album fuscior* and most other southern subspecies), and, in addition their flagellum is a trifle narrower and barely widened beyond middle. Under these circumstances the taxonomic status of the form from Louisiana appears problematic and arbitrary. It is unlikely that 2 different subspecies of the same species should have evolved in so relatively close neighborhood. Therefore, I am tentatively treating the Louisiana form as a full species, although there is no structural support for such hypothesis.

This species is also rather similar to *austropiceipes* Heinrich, but females are distinguished by ivory-tinged (instead of black) tarsi III and by the orange-ferruginous and yellowish declivity of propodeum (entirely black in *austropiceipes*); males have ivory (instead of black) tarsi III.

The association of sexes appears correct.

FEMALE: Length 9-11 mm. Head red, with black marks only on lateral fields of face and hind margin of occiput, and with a very narrow ivory line on frontal and on temple

orbits; thorax black, with extensively ferruginous middle of mesoscutum and the following ivory: collare, pronotal ridge, subalarum, scutellum, postscutellum; areae posteroexternae yellow-tinged ferruginous; area superomedia and tegulae ferruginous; legs ferruginous red including all coxae; coxae III narrowly black at base, more broadly black at apex; all tibiae with conspicuous dorsal ivory mark beyond base; all tarsi ivory-tinged orange; abdomen ferruginous red with black petiole; flagellum black with complete white annulus on segments 8-15 or 16; scape ventrally ferruginous.

FLAGELLUM: Filiform, not widened beyond middle, with 30-31 segments, the 1st nearly twice as long as apically wide, in lateral view the 7th square, on the flat side none distinctly wider than long.

HEAD, THORAX, LEGS, and ABDOMEN: Structure as in *w-album*, except area basalis and area superomedia confluent, the costulae rather strongly oblique, and the sculpture of postpetiole more densely and coarsely irregularly rugose except apically.

MALE: Length 11-12 mm. Very similar to *w-album w-album*, differing from it only in color by (1) greater extent of the white band on mesopleura, which usually covers most of mesopleura, together with exterior part of mesosternum (to sternauli) and (2) by more or less extensive and intensive, usually bipartite, black infuscation on 2nd and 3rd tergite present in great majority of specimens.

Head white, with black pattern as in *w-album*; thorax black, the following white: collare, pronotal ridge and base, subalarum, large median mark on mesoscutum, tegulae, scutellum, postscutellum, extensive w-pattern on propodeum (covering always entire areae spiraculiferae and areae posteroexternae, most of area posteromedia, part or all of area superomedia and apical mark on areae metapleurales), carinal triangle, apical part of prosternum, broad exterior belt of prepectus all around, more than 2/3 of mesopleura, and mesosternum to sternauli; abdomen red, tergites 2 and 3, as a rule, with more or less extensive infuscations, 1st segment black, with apical ivory mark; all coxae and trochanters white, the coxae III on exterior side extensively and basally on interior side black; all femora red, except black apex of femora III; all tibiae ivory, the tibiae III narrowly black at base, broadly black at apex; all tarsi ivory; flagellum black, ventrally pale ochreous, with complete white

annulus on segments 14 or 15 to 20 or 22; scape ventrally ivory.

FLAGELLUM: Rather constantly (5 specimens counted) with 34 segments; with narrow, elongate, almost bacilliform tyloids on segments 5-15 or 16, the longest reaching near to bases and apices of segments.

Holotype: female, Louisiana, Avoyelles Co., Eola, 26-III-1972, D. Shaneck. **Allotype:** male, same data. **Paratypes:** 2 females, 11 males, same data except 26-III-4-VII-1972. **LOUISIANA.** Evangeline Co.: 1 female, Bayou Chicot, 29-IX-6-X-1971, D. Shaneck; 2 males, Chicot State Park, 19-27-X-1971, D. Shaneck. All specimens in CGH II.

DISTRIBUTION (map 69): Central Louisiana.

13. *Cratichneumon excors*, new species Map 70

SYSTEMATICS: This large species, known only by the male, displays the general color pattern of *w-album w-album* (Cresson): a predominantly black mesosternum combined with extensively white-marked head, thorax, and legs with orange abdomen. It differs from *w-album w-album* mainly by constantly larger size and by markedly wider, elongate-oval tyloids which approach the shape of those of *georgius* Heinrich, but are clearly narrower and shorter, not reaching quite to apices of flagellar segments.



Map 69. *Cratichneumon louisianae*, n. sp.

The species is distributed over the western part of the southeastern states and is not particularly rare, but it was not possible to associate it with any of the known females; the only female so far not associated with a matching male is *w-album fuscior* Heinrich. The size of the male, treated below, appears to be too large to match any subspecies of *w-album*, although the color pattern does support such hypothesis. The tyloids of *excors* are markedly different from *w-album*. The possibility cannot be completely excluded, nevertheless, that *excors* may be the male associated to *w-album fuscior*. If this association should at some later date be proven to be correct, *fuscior* would have to be considered a distinct species; for the present, it seems to be advisable to name the problematic male as a new species in order to keep the case in the spotlight for future investigation instead of associating it tentatively with *fuscior* on grounds of mere conjecture.

MALE: Length 14-17 mm. Head white, the following black: antennal cavities, middle of frons, occipital region, band along carina genalis down to mandible base, malar space narrowly, apical margin of cheeks at mandible base; thorax black, the following white: collare, pronotal ridge and base, subalarum, tegulae, median mark on mesoscutum, scutellum, postscutellum, prosternum apically, exterior belt of prepectus in parts to all around, about lower 1/2 of mesopleura together with exterior part of mesosternum to sternauli, or a band on mesosternum along sternauli, carinal triangle, and extensive w-pattern (covering entire or most of areae spiraculiferae, apical mark on areae posteroexternae, and most of area posteromedia); abdomen orange ferruginous, the 1st segment laterally entirely or at least on apical part ivory, dorsally at least to base of postpetiole black, black also on ventral side; postpetiole with apical ivory-tinged band; legs orange; coxae III ventrally usually ivory, ferruginous and black (or 1 or the other) on exterior side and basally on interior side, extensively white marked on dorsal side; the following ivory or yellowish: coxae and trochanters I and II entirely, trochanters III partially, all tarsi, tibiae I and II on dorsal side, a section of tibiae III beyond base, the yellow color shading gradually into orange toward base and middle of tibiae III, base and apex of tibiae III more or less extensively and intensively infuscated on dorsal side; flagellum black, ventrally pale ochreous to brown, with complete white annulus on segments 14 or 15

to, usually, 24 or 25, sometimes only to 22 or 23; scape ventrally white.

FLAGELLUM: With 40-43 segments and with longish-oval, fairly large tyloids on segments 6 or 7 to 16 or 17, the longest not reaching to apices of segments (in contrast to the similar male of *georgius*).

HEAD: Fairly wide; temple profile not narrowed behind eyes, distinctly curved; malar space subobsolete; clypeus with medio-apical depression; carina oralis distinctly raised at mandible base; median field of face moderately and not sharply protruding, the longitudinal lateral impressions only moderately deep.

THORAX: Anterior 1/3 of notauli distinct; scutellum somewhat convex; area supero-media usually about as wide as long, sometimes wider than long.

ABDOMEN: Postpetiole glossy, with very fine sculpture; gastrocoeli obsolete, indicated by an elongate, narrow, irregularly-longitudinally rugose area.

Holotype: male, Tennessee, Henderson Co., Natchez Trail State Park, 6-VI-1972, G. Heinrich, D. Shaneck. **Paratypes:** 6 males, same data, 2-21-VI-1972. All specimens CGH II.

DISTRIBUTION (map 70): In addition to the type material, I have seen the following: **ARKANSAS.** Garland Co.: 4 males, Ouachita State Park, 18-29-V-1972, G. Heinrich, D. Shaneck. **LOUISIANA.** Evangeline Co.: 1

male, Bayou Chicot, 22-29-IX-1972, D. Shaneck. **MISSISSIPPI.** Yalobusha Co.: 2 males, Water Valley, 20-IX-10-X-1970, M. Horan. All specimens in CGH II.

14. *Cratichneumon ritus* Heinrich Map 71

Cratichneumon ritus Heinrich, 1961:143-144, female, male.

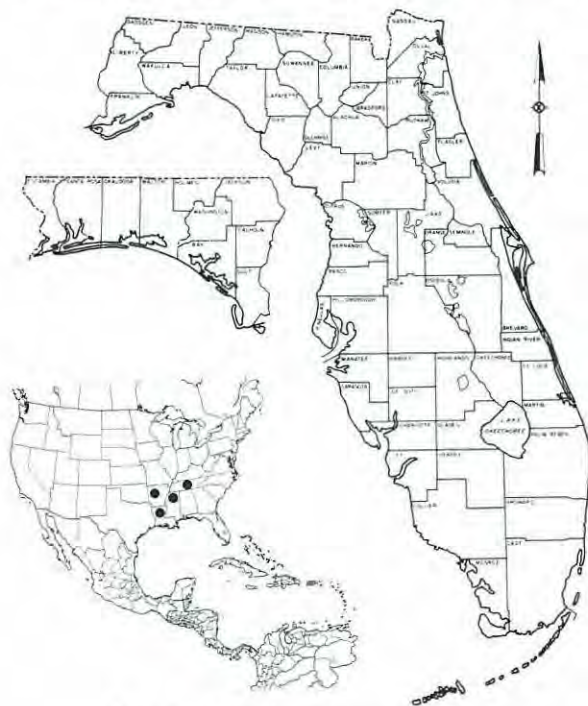
SYSTEMATICS: Very distinct species, though closely related to the *w-album* group. Females on the average somewhat smaller than *w-album w-album* (Cresson) and uniquely distinguished from all similar species by the combination of the following characters: (1) head in frontal view very wide, square, or even slightly wider than high, with the clypeus about 5 times as wide as long; (2) flagellum extremely short and stout, exactly filiform, already the 4th segment square in lateral view; (3) coxae III without scopa.

Males are distinguished by: (1) comparatively wide face and clypeus in frontal view, with obsolete malar space; (2) polished postpetiole and distinctly glossy other tergites, which are finely sculptured, with fine and sparse puncturation only on basal part of 2nd tergite; (3) pale orange basic color on abdomen, shading into yellowish toward its base, the 2nd tergite usually with a transverse, bipartite black mark beyond middle.

This is 1 of the few species with definitely proven association of sexes, as holotype and allotype were captured in copula.

FEMALE: Length 10-14 mm. Head ferruginous, only antennal cavities and strip along carina occipitalis and genalis black; thorax black, the following ferruginous: collare, pronotal ridge broadly, pronotal base narrowly or partially, subalarum, tegulae, areae posteroexternae, and the mesoscutum predominantly to entirely; scutellum and postscutellum ivory, the scutellum usually basally ferruginous; legs ferruginous, the following black: coxae III laterally and dorsally more or less extensively, sometimes dorsal mark on coxae II, usually apex of femora III narrowly, sometimes femora III entirely, tibiae III narrowly at base, more extensively at apex, yellow on dorsal side between black sections; tibiae I and II also with yellow dorsal mark beyond bases; metatarsus III infuscated; abdomen ferruginous, only 1st segment black, except ferruginous apical band; flagellum black, with complete white annulus on segments 7 or 8 to 14; scape ventrally ferruginous.

FLAGELLUM: Filiform, short and stout, with 25-27 segments, the 1st about 1.25 times



Map 70. *Cratichneumon excors*, n. sp.

as long as wide, in lateral view the 4th square, the widest on the flat side slightly wider than long.

HEAD: In front view square or even slightly wider than high; face in lateral view distinctly receding from upper border toward apical margin of clypeus; temple profile not narrowed behind eyes, with moderately curved outline; malar space about 1/2 as long as width of mandible base; cheeks in lateral view very wide between eyes and carina genalis, convex, polished, with coarse and sparse puncturation; clypeus about 5 times as wide as medially long; mandibles long and wide.

THORAX: Mesoscutum barely convex, coarsely and fairly sparsely punctured, shiny between punctures; notauli obsolete; scutellum completely flat; carination of propodeum complete; area superomedia longer than wide, fairly narrow, parallel sided or slightly narrowed toward area basalis; sculpture of propodeum coarse and dense.

LEGS: Rather stout; femora III only 3 times as long as medially wide in lateral view; coxae III without scopa, ventrally densely punctured, shiny between punctures.

ABDOMEN: Postpetiole densely and rather finely, irregularly longitudinally rugose, glossy; thyridia and gastrocoeli indicated; 2nd tergite to about middle finely and moderately densely punctured.

MALE: Length 11-14 mm. Head ivory, the following black: antennal cavities, broad middle of frons, ocellar and occipital regions, and a stripe along carina genalis; malar space never black marked; thorax black, the following ivory: collare, pronotal ridge broadly, pronotal base narrowly, subalarum, tegulae, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, apical part of propodeum (including apical part of areae spiraculiferae beginning from shortly beyond spiracles, areae postero-externae, sometimes also apical margin of area superomedia), prosternum except base, mesosternum extensively to almost entirely, and about lower 1/2 of mesopleura; legs predominantly ivory, the femora III black, ivory on ventral side toward base, orange basally on dorsal side, the tibiae III narrowly black at base, broadly at apex, femora I and II dorsally pale orange, coxae III on dorsal exterior and interior side extensively black, with large dorsal ivory mark; abdomen orange shading into yellowish toward base, the 1st segment black, with apical ivory band; at least 2nd tergite, often also the 3rd with transverse, ill-defined, usually bipartite,

infuscated, or blackish mark beyond middle, sometimes the 3rd tergite basally infuscated; flagellum black, ventrally brownish, with complete white annulus on segments 13 or 14 to 18 or 19 or 20; scape ventrally white.

FLAGELLUM: With 36-40 segments and with narrow, nearly bacilliform tyloids on segments 4 or 5 to 14 or 15.

HEAD: Temple profile barely narrowed behind eyes, with strongly curved outline; malar space obsolete; carinae genalis and oralis meet exactly at corner of mandible, without forming an abscissula; face and particularly clypeus coarsely punctured; apico-median depression of clypeus barely indicated, its thinned apical margin medially a little upward curved; median field of face only slightly protruding, the lateral longitudinal impressions fairly indistinct.

THORAX: Mesoscutum shiny, with coarse puncturation; anterior 1/3 of notauli distinct; scutellum only slightly convex, at base wider than medially long; carination of propodeum complete and very strong, the area superomedia comparatively small, about square, sometimes horseshoe shaped.

ABDOMEN: Postpetiole glossy, almost smooth; 2nd tergite with extremely fine, alutaceous sculpture, shiny, the anterior half with very fine and sparse puncturation.

DISTRIBUTION (map 71): Ontario and Maine west to Iowa, south to Arkansas, Louisiana, and Mississippi. **ARKANSAS.**



Map 71. *Cratichneumon ritus* Heinrich

Garland Co.: 1 male, Ouachita State Park, 16-21-V-1972, G. Heinrich, D. Shaneck. LOUISIANA. Avoyelles Co.: 2 males, Eola, 26-III-1972, D. Shaneck. Evangeline Co.: 4 males, Chicot State Park, 22-V-1-VI-1971, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 3 males, Starkville, 1-14-V-1971, C. Sartor. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 1-3-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

15. *Cratichneumon insulae* Heinrich Map 72

Cratichneumon insulae Heinrich, 1961:151-152, female.

Cratichneumon expers Heinrich, 1972:178-180; new synonymy.

Cratichneumon expers circumflavidus Heinrich, 1972:180; new synonymy.

Holotypes: *Cratichneumon insulae*, female, Rhode Island; CHT. *Cratichneumon expers*, female, Florida; CGH II. *Cratichneumon expers circumflavidus*, female, Mississippi; CGH II. Allotype: *Cratichneumon expers*, male, Florida; CGH II.

SYSTEMATICS: A very distinct species, readily identifiable in both sexes. In color pattern, general appearance and in puncturation of 2nd tergite approaching the *w-album* group, but distinguished from it in females by complete lack of scopa of coxae III, and in both sexes by a strongly abbreviated propodeum. The short propodeum suggests a relationship to the *vinnulus* (Cresson) complex, but the structure of head and flagellum differs from the latter.

Males are well distinguished by the following characters: (1) propodeum rather strongly abbreviated, the area superomedia usually 3 times as wide as long; (2) propodeum predominantly to nearly entirely ivory; (3) temple profile comparatively wide, not narrowed behind eyes, and strongly curved.

The comprehensive material gathered during 1972 in several of the southeastern states reveals that the subspecific division of the species is not tenable; males, as well as females, are individually highly variable in color; 1 or the other pattern may prevail in 1 or the other population, but the overall picture does not show consistency in any larger geographical area.

FEMALE: Length 8-10 mm. Head ferruginous, only antennal cavities, the posterior part of occipital region, and sometimes (Arkansas) spots above clypeal foveae, black; temple orbits always yellow, often also inner

and outer orbits; prothorax and mesothorax black and ferruginous, the following ivory: collar, pronotal ridge broadly, usually pronotal base narrowly, subalarum, scutellum, postscutellum, and sometimes median mark on mesoscutum; tegulae pale ferruginous to yellowish; the following ferruginous: median lobe of mesoscutum more or less extensively, sometimes 2 short lateral bands at tegulae, median part of mesopleura more or less extensively, and restricted band on propleura adjacent to ivory pronotal ridge; propodeum predominantly ferruginous and ivory (or yellowish); black are only: basal furrow, bases of or entire areae superoexternae, areae coxales and areae posteroexternae and rarely also a mark on lower end of area posteromedia; the areae posteroexternae and apical parts of areae spiraculariferae ivory, sometimes entire declivity yellowish tinged; all trochanters and coxae I and II pale orange-tinged ivory, coxae III and all femora orange ferruginous, the coxae III dorsally toward base more or less extensively ivory marked or ivory tinged; all tarsi orange-tinged ivory or ivory; all tibiae orange ferruginous, with more or less distinct ivory mark on dorsal side beyond base; the base of tibiae III narrowly, the apex more broadly blackish infuscated on dorsal side; tip of femora III usually also infuscated; abdomen ferruginous, petiole usually blackish; flagellum black, with not quite complete white annulus on segments 7 or (usually) 8 to 14 or 15; scape ferruginous, sometimes partially infuscated on dorsal side.

FLAGELLUM: Subbristle shaped, fairly long, only slightly widened beyond middle, slightly attenuated toward apex; with 30-31 segments, the 1st about twice as long as apically wide, in lateral view the 7th square, the widest on the flat side nearly 1.5 times as wide as long.

HEAD: Temple profile not narrowed behind eyes, with distinctly curved outline; cheek profile moderately narrowed toward mandible base, with moderately curved outline; outline of head in front view approaching a circular shape; cheeks in lateral view fairly wide and convex, smooth and shiny, with coarse, sparse puncturation; malar space more than 1/2 as long as width of mandible base; median field of face moderately protruding, clypeus a trifle convex, face and clypeus coarsely punctured.

THORAX: Mesoscutum short, about as wide as long, coarsely and fairly densely punctured, shiny between punctures; notauli indicated at base only; propodeum abbrevi-

ated, the area posteromedia about twice as long as the horizontal part medially; area superomedia somewhat wider than long and nearly contiguous with basal furrow, replacing the area basalis almost entirely; carination of propodeum otherwise complete; mesosternum distinctly abbreviated; from coxae II to prepectus barely longer than maximal width of coxae II; pleura very coarsely and densely rugose punctate.

LEGS: Femora III fairly stout; coxae III ventrally moderately densely punctured, polished between punctures, without scopa.

ABDOMEN: Postpetiole finely coriaceous, with some scattered punctures; gastrocoeli and thyridia faintly indicated; 2nd tergite densely and distinctly, though finely, punctured all over, extremely finely coriaceous between punctures; 3rd tergite without distinct puncturation, extremely finely coriaceous.

MALE: Length 10-12 mm. Head ivory, the following black: antennal cavities, middle of frons, ocellar and occipital regions, and small mark on rudimentary malar space; thorax ivory, with the following black parts: mesoscutum (except large median ivory mark), axillary troughs, basal furrow of propodeum, base of prosternum, propleura, about upper 1/3 of mesopleura, areae superoexternae, areae coxales, areae metapleurales basally more or less extensively, prepectus (usually except broadly ivory exterior belt), apical margin of mesosternum together with mark before coxae II; in variations sterna, prepectus, and metapleura sometimes nearly entirely black; abdomen orange, petiole black, postpetiole apically ivory; all coxae and trochanters ivory, the coxae III with apical black mark on dorsal and with basal black mark on interior side, usually orange on exterior side; femora orange, femora I and II ventrally ivory, femora III slightly infuscated at extreme end; all tibiae and tarsi ivory, the tibiae III on dorsal side narrowly blackish at base, more broadly at apex, orange tinged between infuscated sections, with ivory mark or ivory-tinged area in the middle; flagellum black, ventrally pale ochreous to brown, with complete white annulus on segments 12 or 13 or 14 to 23 or 26; scape ferruginous, ventrally ivory, partially infuscated on dorsal side.

FLAGELLUM: With 33-34 segments, and with conspicuous, elongate-oval tyloids on segments 5 or 6 to 14 or 15, the longest, on segments 9-11, reaching from bases to apices of segments.

HEAD: Temple profile not narrowed behind eyes, strongly curved; malar space subobsolete; median field of face moderately strongly protruding toward upper end, the lateral longitudinal depressions fairly distinct and converging toward clypeus.

THORAX: Anterior 1/4 of notauli distinct; scutellum slightly convex; area superomedia strongly transverse, up to 4 times as wide as long.

ABDOMEN: Postpetiole glossy, almost smooth; gastrocoeli narrow, elongate, indicated by irregular, longitudinal rugae; thyridia recognizable, narrow; 2nd tergite moderately finely, densely punctured, the 3rd tergite coriaceous, with extremely fine puncturation on about the basal 1/2.

VARIABILITY: Males show considerable individual variability in the extent and pattern of the ivory markings on the thorax. The mesoscutum bears usually only 1 median ivory mark, often bipartite in front; there is in addition sometimes a short, longitudinal, lateral band on each side of the mesoscutum. In 1 specimen (from Arkansas) the median ivory mark of mesoscutum is divided into 2 conspicuous, parallel, longitudinal bands, extending over the entire length of the mesoscutum; the propodeum is sometimes completely ivory, except only areae coxales black.

DISTRIBUTION (map 72): Rhode Island and New Jersey, south to northern Florida,



Map 72. *Cratichneumon insulae* Heinrich

west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 2 females, 3 males, Ouachita State Park, 14-30-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 9 males, Gold Head Branch State Park, 27-IV-6-V-1971, G. Heinrich, D. Radtke. Duval Co.: 1 female, Jacksonville, 8-V-1971, C. Zeiger. Leon Co.: 1 female, Tall Timbers Research Station, 7-17-V-1968, G. Heinrich. Liberty Co.: 1 female, Torreya State Park, 11-V-1968, G. Heinrich. LOUISIANA. Webster Co.: 4 males, Bistineau State Park, 27-IV-4-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 2 females, Starkville, 30-V-4-VI-1971, C. Sartor. TENNESSEE. Henderson Co.: 1 female, 1 male, Natchez Trail State Park, 1-14-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

**16. *Cratichneumon vinnulus* (Cresson)
Map 73**

Ischnus vinnulus Cresson, 1864:189, male.

Cratichneumon vinnulus, Townes and Townes, 1951:289, male. Heinrich, 1961:138-139, male only.

Cratichneumon gracilior Heinrich, 1961:147-148, female only; new synonymy.

Holotypes: *Ischnus vinnulus*, male, Pennsylvania; ANS. *Cratichneumon gracilior*, female, Maine; CGH II.

SYSTEMATICS: This species follows the *w-album* group in color pattern and punctuation of the 2nd tergite. Females are distinguished from the majority of species of that group by (1) an abbreviated propodeum, (2) lack of scopa on coxae III, and (3) a bristle-shaped flagellum; all these 3 characters are shared with the preceding species, *insulae* Heinrich; differing from *insulae* in structure of head and flagellum. Males can be readily distinguished from *insulae* by temple profile distinctly narrowed behind eyes, and in color by basally extensively black areae spiraculiferae and usually predominantly black area posteromedia; besides, in the *vinnulus* male the postpetiole is always apically ivory banded, and the anterior tergites usually are basally black banded.

Among the many taxonomically difficult species of the genus, this is perhaps the most complex; the association of sexes has remained problematic until recently; the comprehensive material gathered during the past 5-6 years in most of the southeastern and in some of the northeastern states strongly suggests (1) that the female described in 1961 as the other sex of *vinnulus* does not belong to that species, and (2) that instead in all probability *Cratichneumon gracilior* Hein-

rich (1961) represents the correct female of *vinnulus*, which renders *gracilior* a synonym of *vinnulus*; the allotype of *gracilior* is a male of the *w-album* group of still not certain specific identity, perhaps an odd variation of *annulatus* Provancher. The neallotype associated 1961 with *vinnulus* belongs to the later described species *paraparatus* Heinrich.

FEMALE: Length 9-15 mm. Head ferruginous, black, and ivory in individually highly variable proportions; ivory are at least the temple orbits, usually also the frontal orbits and upper part of or entire outer orbits, sometimes also face and clypeus partially to nearly entirely; black are usually: antennal cavities, ocellar region, occipital region, and cheeks except ivory outer orbits; frons between ocellar region and antennal cavity usually ferruginous, sometimes black; color of face and clypeus varying between ivory and ferruginous, with usually a blackish patch above clypeal fovea; cheeks often ferruginous between ivory orbits and black posterior belt; thorax always black, with the following ivory markings: collare, pronotal ridge, usually lower end of pronotal base, subalarum, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, and 2 lateral marks on declivity of propodeum (including areae posteroexternae and apical margin or part of areae dentiparae and of areae spiraculiferae); abdomen orange ferruginous, the petiole black, postpetiole with apical ivory band or ivory latero-apical marks; legs orange ferruginous, including coxae; all tibiae with small, usually ill-defined ivory mark dorsally beyond base; in small specimens dorsal side of tibiae III often blackish infuscated before and particularly beyond ivory mark; coxae III with large dorsal ivory mark and usually with apical black mark on exterior dorsal side; coxae I and II usually also ivory marked on dorsal side; flagellum black, with complete white annulus on segments 7 or (usually) 8 to 14 or 15 or 16; scape ventrally ferruginous.

FLAGELLUM: Bristle shaped, fairly slender, distinctly attenuated toward apex, scarcely widened beyond middle, with 35-40 segments, the 1st somewhat more than twice as long as apically wide, the 7th square.

HEAD: Temple profile moderately narrowed behind eyes, with slightly curved outline; cheek profile distinctly narrowed toward mandible base, with almost straight outline; malar space nearly as long as width of mandible base; clypeus slightly convex; median field of face moderately protruding.

THORAX: Mesoscutum somewhat longer than wide, coarsely punctured, glossy between punctures; propodeum abbreviated, the area posteromedia markedly longer than the horizontal part medially; carination prominent and complete, area superomedia about as wide as long or somewhat wider than long, hexagonal, often not clearly separated from area basalis; carinae dentiparae interiores strongly developed, in large specimens lamelliform; lower part of mesopleura very coarsely and densely reticulate rugose.

LEGS: Moderately slender; coxae III ventrally fairly densely punctured, extremely finely coriaceous between punctures and shiny, without trace of scopa.

ABDOMEN: Median field of postpetiole fairly distinct, finely irregularly rugose; gastrocoeli indicated by rugosity, thyridia fairly distinct; 2nd tergite apically wider than medially long, distinctly and densely punctured nearly to the end, the 3rd tergite alutaceous with some extremely fine punctures on basal part; ovipositor markedly projecting.

MALE: Length 9-14 mm. Head white, the following black: antennal cavities, broad middle of frons, ocellar and occipital regions; malar space never black marked; thorax black, the following white: collare, pronotal ridge and base, subalarum, tegulae, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, areae posterolaterales together with apical margin or apical part of areae spiraculiferae, dentiparae and posteromedia, prosternum (except basally), mesosternum (except apical black margin and black mark in front of coxae II), about lower 1/2 of mesopleura (except apical section); metapleura always black, except sometimes apical ivory mark; legs orange; coxae and trochanters I and II uniformly, coxae III dorsally and ventrally extensively ivory; trochanters III ivory, the 1st trochanters III infuscated basally on dorsal side; coxae III extensively black on exterior side, interior side, and apically on dorsal side; all tibiae on dorsal side and all tarsi ivory, the tibiae III narrowly black at base, extensively black toward apex on dorsal side; femora III usually apically black; abdomen orange; 1st segment black, with broad apical ivory band, sometimes postpetiole orange before ivory band; at least the 2nd tergite with broad basal black or infuscated band (sometimes bipartite), often also 3rd and 4th tergite with narrower basal black bands; tergite 2 and 3 with ill-defined, apical, ivory bands; flagellum black, ventrally brownish, with complete

white annulus on segments 14 or 15 to 22 or 23; scape ventrally ivory.

FLAGELLUM: With 34-40 segments and with narrowly-oval tyloids on segments 7 or 8 to 16 or 17, the longest not reaching to apices of segments.

HEAD: Temple profile somewhat narrowed behind eyes, with curved outline; malar space subobsolete, less than 1/3 as long as width of mandible base; clypeus a trifle convex, without apico-median impression; median field of face slightly protruding; carina oralis not raised; frons between antennal cavity and lower ocellus coarsely and very densely punctured.

THORAX: Almost anterior 1/2 of notauli distinct; scutellum somewhat convex and somewhat raised above postscutellum; propodeum abbreviated, the area superomedia about twice as wide as long; carinae dentiparae interiores strongly prominent.

ABDOMEN: Postpetiole glossy, with extremely fine sculpture; 2nd and 3rd tergites distinctly and densely, the 4th tergite more finely punctured; thyridia rather distinct, kidney shaped; gastrocoeli indicated by rugosity.

VARIABILITY: Broad series of females gathered during recent years in most of the southeastern states and in New York and Maine as well, show rather striking differences in size and also considerable variation in chromatic characters. Two categories of quite different sizes are noticeable: small specimens of 9-12 mm length and large specimens of 14-15 mm length; both sizes were rarely found intermingling, more often separately in different localities or different times. In the small specimens the basic color of dorsal side of tibiae III varies from orange to blackish and the basic color of head from ferruginous combined with black and restricted ivory markings to sometimes predominantly ivory. Large specimens with infuscated tibiae III were never found, and predominantly ivory head color is prevailing. Distinctive structural characters confirming specific differentiation between the 2 size categories were not found.

DISTRIBUTION (map 73): From Quebec, Ontario, and Michigan south to northern Florida, west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 9 females, 15 males, Ouachita State Park, 8-27-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 5 females, 2 males, 24-27-IV-1971-1972, G. Heinrich, D. Radtke. GEORGIA. Clarke Co.: 1 male, Athens, 1-VI-1969, G. Heinrich.



Map 73. *Cratichneumon vinnulus* (Cresson)

Monroe Co.: 11 females, 6 males, Forsyth, 20-IV-17-X-1970, F. Naumann. LOUISIANA. Avoyelles Co.: 1 male, Eola, 24-III-5-IV-1972, D. Shaneck. Evangeline Co.: 3 males, Bayou Chicot, 11-18-VIII-1971, 12-22-III-1972, D. Shaneck. Webster Co.: 4 females, 6 males, Bistineau State Park, 6-30-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 5 males, Starkville, 16-IV-7-V-1971, C. Sartor. Yalobusha Co.: 4 females, 2 males, Water Valley, 20-IX-20-X-1970, 22-IV-22-V-1971, M. Horan. TENNESSEE. Henderson Co.: 12 females, 7 males, Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

17. *Cratichneumon horani* Heinrich Map 74

Cratichneumon horani Heinrich, 1972:180-181, female, male.

Holotype: female, Mississippi, CGH II. Allotype: male, Mississippi; CGH II.

SYSTEMATICS: Females of this species share the medially ivory-marked tibiae and the punctured sculpture of the 2nd tergite with the *w-album* group, but are chromatically distinguished by an entirely orange-ferruginous mesoscutum with median ivory mark; they are furthermore characterized by (1) lack of scopa on coxae III and (2) the structure of flagellum; the flagellum is fairly long, somewhat widened beyond middle and distinctly tapering toward apex.

Males are distinguished in color by black mesoscutum with ivory (usually surrounded by rufous) median mark, combined with uniformly ivory sterna and areae metapleurales, with medially ivory tibiae III, and with uniformly (including 1st segment) orange abdomen with apical ivory band on postpetiole.

FEMALE: Length 8-10 mm. Head orange, the following ivory: band around eyes (rarely interrupted on malar space), sometimes widened on outer orbits over nearly entire surface of cheeks, often small marks on sides of clypeus, and mandibles except teeth; only antennal cavities and ocellar triangle blackish infuscated; thorax orange, with extensive ivory and some black markings; the following ivory: collare, pronotal ridge and base, subalarum, scutellum, postscutellum, carinal triangle, areae posteroexternae, usually an ill-defined mark on the end of area metapleuralis, and more or less extensive, ill-defined or diffuse areas on mesopleura; the following black: propleura and prosternum partially (usually predominantly), marginal deepening around mesoscutum, basal furrow of scutellum, axillary troughs, basal furrow of propodeum, areae coxales, prepectus, a narrow band around upper posterior corner of mesopleuron, and the mesosternum at least medially, usually more extensively to predominantly; abdomen uniformly orange; coxae and trochanters I and II, large mark on dorsal side of coxae III, and marks on dorsal side of all tibiae beyond base, ivory; sometimes tibiae III before and behind ivory mark on dorsal side and a mark on exterior side of apex of coxae III blackish infuscated, rarely also the extreme end of femora III black; rest of legs orange, all tarsi ivory-tinged orange; flagellum black, with complete white annulus on segments 7 or 8 to 15 or 16; scape predominantly ferruginous.

FLAGELLUM: Subbristle shaped, fairly stout, moderately long, slightly widened beyond middle, distinctly tapering toward apex, with 31-33 segments, the 1st about twice as long as apically wide, in lateral view the 7th square, the widest on the flat side nearly 1.5 times as wide as long.

HEAD: Temple profile a trifle narrowed behind eyes, with curved outline; cheek profile moderately narrowed toward mandible base, slightly curved; malar space nearly as long as width of mandible base; median field of face slightly protruding.

THORAX: Mesoscutum distinctly longer than wide, somewhat convex, coarsely and moderately densely punctured, finely cori-

aceous between punctures, somewhat shiny; only short, anterior section of notauli distinct; area superomedia and area basalis confluent, forming a nearly parallel-sided, somewhat longer than wide, central area; rest of carination complete and distinct, only costulae sometimes indistinct; horizontal part of propodeum medially somewhat shorter, but more than 1/2 as long as area posteromedia.

LEGS: Moderately stout; coxae III without scopa.

ABDOMEN: Median field of postpetiole very finely coriaceous rugose, without or with a few scattered punctures; gastrocoeli superficial, thyridia recognizable; 2nd tergite finely and fairly densely punctured nearly to the end, the 3rd tergite still finer punctured, nearly to the middle; space between punctures of 2nd and 3rd tergites very finely coriaceous, slightly shiny; ovipositor somewhat projecting.

MALE: Length 9-11 mm. Head ivory, the following black: antennal cavities, middle of frons, ocellar and occipital regions, and mandible teeth; black on occipital region varying individually to ferruginous; malar space never black marked; thorax ivory and black, the mesoscutum and anterior areae of propodeum, including areae dentiparae, varying individually from predominantly black to predominantly ferruginous; areae spiraculiferae usually ferruginous; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae, median mark on mesoscutum, postscutellum, carinal triangle, declivity of propodeum, entire areae metapleurales, prosternum (usually except base), broad exterior belt of prepectus, mesosternum, and mesopleura (except black mark on upper, posterior section); area coxalis always black; abdomen uniformly orange, except apical ivory band on postpetiole; coxae and trochanters I and II and most of trochanters III ivory; coxae III orange, with large ivory mark on dorsal side, black or blackish toward apex at least on exterior and upper side; all femora orange, the femora III usually blackish at apex; tibiae ivory on dorsal side, orange on ventral side, the tibiae III dorsally black at base and more broadly at apex; all tarsi ivory; flagellum black, ventrally brown, with complete white annulus on segments 13 or 14 to 21 or 22; scape ventrally white.

FLAGELLUM: With 34-36 segments and with nearly bacilliform, unobtrusive (hidden by short hairs) tyloids on segments about 7 to 14 or 16.



Map 74. *Cratichneumon horani* Heinrich

HEAD: Temple profile slightly narrowed behind eyes and slightly curved; malar space about 1/4 as long as width of mandible base; clypeus without medio-apical impression; median field of face barely protruding, the longitudinal, lateral impressions only slightly indicated; face and clypeus evenly, fairly finely and fairly densely punctured.

THORAX: Mesoscutum convex, longer than wide, densely and fairly coarsely punctured, coriaceous between punctures, somewhat shiny; anterior 1/4 of notauli distinct.

DISTRIBUTION (map 74): Northern Florida, Georgia, Mississippi, Louisiana, Arkansas, and Tennessee. **ARKANSAS.** Garland Co.: 3 males, Ouachita State Park, 15-21-V-1972, G. Heinrich, D. Shaneck. **FLORIDA.** Alachua Co.: 1 female, Gainesville, 2-V-1968, G. Heinrich. **GEORGIA.** Monroe Co.: 2 males, Forsyth, 18-31-X-1970 and 14-22-V-1971, F. Naumann. **LOUISIANA.** Avoyelles Co.: 1 male, Eola, 20-29-IV-1972, D. Shaneck. Evangeline Co.: 2 males, Bayou Chicot, 1-8-IX-1971, D. Shaneck. Webster Co.: 2 females, 4 males, Bistineau State Park, 10-IV-3-V-1972, G. Heinrich, D. Shaneck. **MISSISSIPPI.** Yalobusha Co.: 5 females, 30 males, Water Valley, 28-IV-23-XI-1970 (all months except VI), M. Horan. **TENNESSEE.** Henderson Co.: 3 females, Natchez Trail State Park, 2-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

18. *Cratichneumon erythroscuta*

Heinrich

Map 75

Cratichneumon erythroscuta Heinrich, 1961:142-143, female.

Holotype: female, Massachusetts; MCZ.

SYSTEMATICS: Another species with ferruginous mesoscutum combined with the tibiae ivory marked beyond base and with the punctured 2nd tergite. Uniquely distinguished by (1) very strongly-developed head structure, with the temple profile not and cheek profile barely narrowed behind eyes and toward mandible base respectively; (2) sparsely punctured, glossy coxae III with thinly haired but distinct scopa; (3) flagellum subbristle shaped, moderately stout, slightly attenuated toward apex.

FEMALE: Length 10-11 mm. Head and thorax ferruginous, with some ivory and black markings; abdomen uniformly ferruginous; the following ivory: facial, frontal, vertical, and temple orbits narrowly, collar, pronotal ridge broadly, subalarum, scutellum, postscutellum, and areae posteroexternae; the following black: antennal cavities restrictedly, exterior margin of mesoscutum all around, basal furrow of scutellum, axillary troughs, prosternum and mesosternum predominantly or entirely, propleura predominantly, prepectus, band around upper hind corner of mesopleura, and the areae coxales; areae superoexternae and areae dentiparae sometimes blackish infuscated; legs ferruginous, including coxae and tarsi; tibiae with ivory mark on dorsal side beyond base; tibiae III sometimes slightly to distinctly infuscated dorsally at base and apex; coxae III with ill-defined yellowish mark on dorsal side; flagellum black, with not quite complete white annulus on segments 7-15, section before annulus brownish on ventral side; scape ferruginous.

FLAGELLUM: Subbristle shaped, moderately stout, slightly widened beyond middle, slightly attenuated toward apex, with 30-32 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 7th square, the widest about 1.5 time as wide as long.

HEAD: Temple profile slightly widened behind eyes, strongly curved; cheek profile in frontal view a trifle narrowed toward mandible base, with gradually curving outline, cheeks in lateral view very wide and inflated; malar space $1\frac{1}{2}$ as long as width of mandible base; median field of face distinctly, lateral fields toward clypeus slightly protruding.

THORAX: Mesoscutum somewhat longer than medially wide, coarsely punctured, glossy between punctures; notauli distinct at base only; carination of propodeum distinct and complete, area superomedia, however, not, or indistinctly separated from area basalis, with (oblique) costulae slightly beyond middle, usually narrowed from costulae toward area basalis; mesopleura and metapleura very coarsely and densely, irregularly, rugose punctate.

LEGS: Moderately stout; coxae III glossy on ventral side, with sparse puncturation and with a somewhat sparsely-pilose but distinct scopa.

ABDOMEN: Postpetiole finely coriaceous rugose, with a few scattered punctures; 2nd tergite finely and fairly densely punctured close to apical border; 3rd tergite alutaceous, with some scattered, extremely fine punctures on basal part; gastrocoeli subobsolete, thyridia fairly distinct.

DISTRIBUTION (map 75): Massachusetts, New Jersey, Tennessee. TENNESSEE. Henderson Co.: 2 females, 3-24-VI-1972, G. Heinrich, D. Shaneck (CGH II).

19. *Cratichneumon naumanni* Heinrich

Map 76

Cratichneumon naumanni Heinrich, 1971: 994-995, female.



Map 75. *Cratichneumon erythroscuta* Heinrich

Holotype: female, Georgia; CGH II. Neallotype: male, Georgia, Monroe Co., Forsyth, 5-12-VI-1970; CGH II (present designation).

SYSTEMATICS: The similarity of this form with the preceding, *erythroscuta* Heinrich, is startling. The chromatic characters are practically identical, with only 1 significant difference: the tibiae of *naumanni* show no trace of an ivory mark on dorsal side, present in *erythroscuta* and in nearly all of the species treated before. The structural characters of the 2 species are also nearly identical, except the head structure, the cheeks being less inflated in *naumanni* and temple profile slightly narrowed behind eyes.

As the 2 forms seemingly are not sympatric, *naumanni* being recorded from Georgia, Louisiana, and Arkansas, *erythroscuta* only from Tennessee and northward, they may well represent associated geographical subspecies in spite of the differentiation in head structure.

The association of the male, described below, is tentative. It is rather similar to *subfilatus* Heinrich, differing mainly by uniformly ivory (instead of predominantly black) areae metapleurales and by the temple profile less narrowed behind eyes.

FEMALE: Length 10-13 mm. Head ferruginous, without ivory or black markings; only the antennal cavities often partially black; thorax ferruginous, with ivory and black markings; the following ivory: collare, pronotal ridge, pronotal base narrowly, indistinctly and partially, subalarum, scutellum, postscutellum, more or less distinctly and extensively the areae posteroexternae, and carinal triangle; the following black: sutures around mesoscutum narrowly, prosternum basally more or less extensively, entire prepectus, entire mesosternum, lower part of propleura, mesopleura narrowly along upper and upper posterior margin, areae coxales, basal furrow of scutellum, axillary troughs, and basal furrow of propodeum; areae dentiparae sometimes infuscated; abdomen uniformly ferruginous; legs ferruginous, all 1st trochanters whitish on dorsal side, the coxae III on dorsal side toward base yellowish; flagellum black, with not quite complete annulus on segments 8-14 or 15 or 16; scape ferruginous.

FLAGELLUM: Subbristle shaped, moderately stout, slightly widened beyond middle, slightly attenuated toward apex; with 30-34 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 5th or 6th

square, the widest about 1.5 times as wide as long.

HEAD: Temple profile slightly narrowed behind eyes, with curved outline; cheek profile, in frontal view, somewhat narrowed toward mandible base, with nearly straight outline; cheeks in lateral view rather wide but not inflated, only slightly convex; malar space $1/2$ as long as width of mandible base.

THORAX, LEGS, and ABDOMEN: As in *erythroscuta*.

MALE: (Tentative; description based on a series of 7 specimens from the type locality). Length 12-15 mm. Head ivory, the following black: antennal cavity, middle of frons broadly, ocellar and occipital regions; thorax black and ivory; the following ivory: collare, pronotal ridge and base, subalarum, tegulae, large median mark on mesoscutum, scutellum, postscutellum, carinal triangle, extensive w-pattern on propodeum (including entire areae metapleurales, areae spiraculiferae, declivity of propodeum, and area superomedia), prosternum, mesosternum, most of mesopleura (excluding only black band in upper hind corner), and broad exterior belt all around prepectus; abdomen uniformly orange, including 1st segment, the latter with apical ivory band and ivory sides; legs predominantly orange; coxae I and II and dorsal side of 1st trochanters III ivory; coxae III predominantly ivory, orange on exterior side, with small black apico-dorsal mark; all tarsi and dorsal sides of tibiae I and II ivory tinged, the tibiae III usually faintly ivory tinged on dorsal side behind base; flagellum black, with white annulus, ventrally pale ochreous, scape ventrally ivory.

FLAGELLUM: With 37-39 segments and with fairly narrow, nearly bacilliform tyloids on segments 6, sometimes 5 or 7, to 14 or 15.

HEAD: In dorsal view wider than in *subfilatus*, the temple profile not narrowed behind eyes, fairly strongly curved; eyes not bulging; malar space subobsolete; median field of face slightly protruding; clypeus with indication of small medio-apical concavity.

DISTRIBUTION (map 76): ARKANSAS. Garland Co.: 6 females, 5 males, Ouachita State Park, 11-29-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Monroe Co.: 1 female, 6 males, 20-V-23-VI-1968 and Forsyth, 1 female, 6 males, 20-V-23-VI-1968 and 1 male, 10-17-VI-1971, G. Heinrich, F. Naumann. LOUISIANA. Webster Co.: 4 females, Bistineau State Park, 15-IV-9-V-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.



Map 76. *Cratichneumon naumanni* Heinrich

20. *Cratichneumon carolinae* Heinrich Map 77

Cratichneumon carolinae Heinrich, 1971: 991-992, female.

Holotype: female, North Carolina; CGH II. Neallotype: male, Florida; CGH II (present designation).

SYSTEMATICS: A slender and fairly small species, of light orange basic color of entire body including mesoscutum. Well distinguished by the combination of the following characters: (1) flagellum subbristle shaped, fairly slender; (2) coxae III without scopa; (3) sculpture of the horizontal part of propodeum finely and densely coriaceous rugose, without complete, distinct carination, with only apical part of lateral carinae of area superomedia recognizable; (4) tibiae without a trace of yellow marks on dorsal side beyond base; (5) 2nd tergite distinctly punctured.

FEMALE: Length 8-9 mm. Head predominantly white, with only antennal cavities partially black; the following orange: broad middle of frons, ocellar and occipital regions, and a band along carina genalis to mandible base; thorax light orange; the following ivory: collare, pronotal ridge, subalarum, tegulae, scutellum, post-scutellum, declivity of propodeum, and a large, ill-defined mark on lower 1/2 of mesopleura; the following black: base of

prosternum, basal part of prepectus, middle of propleura, small mark below subalarum, exterior sutures of mesoscutum narrowly, basal furrow of scutellum, axillary troughs, and basal furrow of propodeum; abdomen uniformly orange; legs orange, without infuscations; the following white: coxae I and II predominantly, all trochanters I and II, and 1st trochanters III; flagellum black, with complete white annulus on segments 7 (apex) to 14; scape ventrally orange, segments before annulus sometimes ventrally brownish.

FLAGELLUM: Bristle shaped, fairly slender, slightly widened beyond middle, distinctly attenuated toward apex, with 32 segments, the 1st about twice as long as apically wide, in lateral view the 8th approximately square, the widest slightly wider than long.

HEAD: Temple profile moderately narrowed behind eyes, slightly curved; cheek profile moderately narrowed toward mandible base, with almost straight outline; malar space somewhat shorter than width of mandible base; median field of face moderately protruding; face and frons rather finely and fairly sparsely punctured, very finely coriaceous between punctures.

THORAX: Mesoscutum longer than wide, convex, rather finely and moderately densely punctured, coriaceous between punctures, nearly subopaque; anterior 1/3 of notauli distinct; horizontal part of propodeum medially markedly shorter than area posteromedia, finely and densely, irregularly coriaceous rugose, with incomplete carination, only the apical parts of lateral carinae of area superomedia recognizable; lateral carinae of area posteromedia subobsolete.

LEGS: Fairly slender; coxae III ventrally finely and densely punctured, finely coriaceous between punctures, subopaque, without scopa.

ABDOMEN: Fairly narrow, longish, the ovipositor distinctly projecting; postpetiole densely and finely coriaceous rugose, with faintly-indicated median field; gastrocoeli obsolete, thyridia indicated, about as wide as their interspace; 2nd tergite densely and finely punctured, coriaceous between punctures, subopaque; 3rd tergite less densely and more finely punctured to beyond middle.

VARIABILITY: Extent of black on propleura variable from longitudinal band, to minor mark or complete absence; color of area posteromedia variable from orange to ivory; extent of ivory on mesopleura sometimes reduced to a small mark.

MALE: (Tentative). The 2 males from Florida, described below, match the females of *carolinae* so well in structure, color, and size that the association of sexes appears, with a high degree of probability, to be correct; what causes a slight doubt is only the fact that a female of *carolinae* has not been collected in Florida; the records from Monroe Co., Georgia, are close enough, however, to make the occurrence of the species in northern Florida very likely.

Length 8 mm. Head white, including entire frons, only antennal cavities black, the ocellar and occipital regions orange; thorax orange, with black and ivory markings; the following black: exterior margin of mesoscutum, basal furrow of scutellum, axillary troughs, propleura, base of prosternum, mark below subalarum, mark on mesopleura in front of coxae II, prepectus predominantly, basal furrow of propodeum all around, and areae coxales; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae, an ill-defined, bipartite median mark on mesoscutum, scutellum, postscutellum, marks on areae posteroexternae, prosternum almost entirely, mesosternum, exterior belt of prepectus broadly all around, and less than lower 1/2 of mesopleura (the ivory color gradually shading into the orange upper surface of mesopleura); abdomen orange, the 1st or 1st and 2nd tergite apically ivory; legs orange and ivory, without infuscated or black parts; the following ivory: all trochanters, coxae I and II, coxae III on ventral side apically or for the entire length, apices of femora I and II, tibiae I and II dorsally, tibiae III narrowly at base, and all tarsi; flagellum black with complete white annulus on segments 11 or 12 to 21 or 23; scape ventrally white.

FLAGELLUM: With 31-33 segments and with elongate, narrow, white tyloids on segments 6 to 13 or 14, the longest (on segments 8-10) nearly reaching to bases and apices of segments.

HEAD: Temple profile slightly narrowed behind eyes, with curved outline; malar space subobsolete; median field of face slightly protruding.

THORAX: Mesoscutum finely and fairly densely punctured, coriaceous between punctures, close to subopaque; anterior 1/3 of notauli distinct; scutellum markedly raised above postscutellum, medially shorter than basally wide, laterally carinate at the extreme base; carination of propodeum complete; area posteromedia nearly twice as

long as horizontal part medially; area superomedia wider than long.

ABDOMEN: Postpetiole with fairly distinct median field, very finely irregularly rugose and coriaceous; 2nd tergite finely and densely punctured, coriaceous between punctures, the 3rd tergite with extremely fine and shallow puncturation and coriaceous.

DISTRIBUTION (map 77): ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 22-27-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 2 males, Gold Head Branch State Park, 25-27-IV-1971, G. Heinrich, D. Radtke. GEORGIA. Monroe Co.: 2 females, Forsyth, 20-30-V-1968, G. Heinrich. LOUISIANA. Avoyelles Co.: 2 females, Eola, 15-V-15-VI-1972, D. Sartor. NORTH CAROLINA. Wake Co.: 1 female, Raleigh, 10-VI-1951, G. Heinrich. TENNESSEE. Henderson Co.: 2 females, Natchez Trail State Park, 13-23-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

21. *Cratichneumon paraparatus* Heinrich Map 78

Cratichneumon vinnulus Heinrich, 1961:138-140; partim (female).

Cratichneumon paraparatus Heinrich, 1962: 869-870, female.

Holotype: female, North Carolina; CHT. Neallotype: male, Florida, Tall Timbers



Map 77. *Cratichneumon carolinae* Heinrich

Research Station, 7-17-V-1968. CGH II (present designation).

SYSTEMATICS: This is the 1st of 3 species of the *paratus* group occurring in the southeastern states. This group approaches in color pattern the preceding, *w-album* group, it differs from it by lack of puncturation on the 2nd tergite, the latter showing a fine-coriaceous sculpture. Females of *paraparus* are distinguished chromatically by at least the vertical orbits, sometimes also frontal orbits and outer orbits, being ivory marked, and particularly by an apical ivory band on the postpetiole.

Males are rather similar to *vinnulus* (Cresson) but differ by lack of the black basal annulus on tibiae III and by much finer, almost-impunctate sculpture of the 3rd tergite.

C. paraparus is distributed over the entire southeastern region, including northern Florida, while the distribution of the 2 other members of the *paratus* group, *floridensis* Heinrich and *paratus pseudovinnulus* Heinrich, is divided, the former being confined to Florida, the latter subspecies occurring in all southeastern states except Florida.

FEMALE: Length 8-12 mm. Head ferruginous red; black or blackish are at least the antennal cavities and usually the ocellar region, sometimes (particularly in northern specimens) also the occipital region and middle of frons; the following are ivory: at least a short line on temple orbits, in southeastern specimens usually also inner and outer orbits extensively; color of face, clypeus, and lower cheeks pale orange, varying to predominantly or entirely pale yellowish; thorax black; the following are more or less extensively ferruginous red: posterior part of median lobe of mesoscutum, mesopleura medially, posterior parts of areae spiraculiferae and of areae dentiparae, upper part of area posteromedia, sometimes also upper part of propleura; the following ivory: collare, pronotal ridge and base, subalarum, rarely median mark on mesoscutum, always scutellum, postscutellum, carinal triangle, areae posteroexternae, usually an ill-defined, small mark on lower, apical part of mesopleura; tegulae pale ferruginous, sometimes with ivory mark; abdomen orange ferruginous, the postpetiole with apical ivory band; petiole basally usually blackish; 2nd tergite sometimes with a blackish-infuscated patch on each side behind thyridia; legs predominantly ferruginous, including basic color of coxae III, the latter with large, dorsal,

ivory mark, in northern specimens usually blackish infuscated on exterior side and on base of interior side; all tibiae with large ivory mark on dorsal side beyond base, tibiae III black on dorsal side beyond ivory mark, barely infuscated or reddish before ivory mark; all trochanters and dorsal side of coxae I and II ivory, ventral side of coxae I and II and all tarsi orange-tinged ivory; tip of femora III rarely blackish; flagellum black, with complete white annulus on segments 7 or 8 to 14 or 15; segments before annulus apically narrowly, on ventral side more extensively brownish; scape orange, infuscated on exterior side.

FLAGELLUM: Subfiliform, a trifle attenuated toward apex, not or slightly widened beyond middle, with 29-32 segments, the 1st about twice as long as apically wide, in lateral view the 7th square.

HEAD: Temple profile slightly narrowed behind eyes, with moderately curved outline, cheek profile distinctly narrowed toward mandible base, both profiles more narrowed than in the closely related subspecies *paratus pseudovinnulus*; malar space nearly as long as width of mandible base; clypeus a trifle convex; median field of face moderately protruding.

THORAX: Mesoscutum coarsely and moderately densely punctured, polished between punctures; anterior 1/4 of notauli distinct; carination of propodeum strong and complete, except area basalis and area superomedia confluent; sculpture of pleura very densely and very coarsely reticulate rugose.

LEGS: Fairly stout, but femora not quite as thick and short as in the 2 related forms, *paratus pseudovinnulus* and *floridensis*; coxae III ventrally fairly densely punctured, extremely finely coriaceous between punctures, with distinct, pale scopa.

ABDOMEN: Median field of postpetiole indicated, densely, irregularly rugose; thyridia recognizable; 2nd tergite densely and very finely coriaceous, without puncturation, except some extremely fine, microscopic punctures usually on basal part.

MALE: Length 9-14 mm. Head white, the following black: mandible teeth, antennal cavities, middle of frons narrowly, ocellar and occipital regions; thorax black, the following white: collare, pronotal ridge, pronotal base, subalarum, tegulae, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, extensive w-pattern on propodeum (including upper part or all of area posteromedia, entire areae posteroexternae, apical part of areae dentiparae,

almost entire areae spiraculiferae, and more or less extensive apical parts of areae metapleurales), prosternum except base, mesosternum except apical black margin and black mark in front of coxae II, usually exterior belt all around prepectus (sometimes only partially), mesopleura predominantly; tergites 1 and 2 predominantly black, the postpetiole with broad apical ivory band and ivory lateral surfaces, the 2nd tergite usually with ill-defined, apical, ivory-whitish band, orange between that band and basal black section; tergites 3-7 orange, 3-5 with, from tergite to tergite less extensive, basal black bands; all femora orange, the femora III darker orange than femora I and II and with blackish tip; all tibiae and tarsi ivory, the tibiae III apically on dorsal side broadly black; all trochanters and coxae I and II white; coxae III with large, dorsal, white mark, black on exterior side, on basal part of interior side, and dorsally toward apex on exterior side, narrowly white ventrally or more or less ferruginous orange on ventral and lower part of exterior side; flagellum black, with complete white annulus on segments 13 or 14 to 20 or 21 or 22; ventrally pale ochreous to brownish; scape ventrally and on interior side white.

FLAGELLUM: With 32-37 segments and with narrowly-oval tyloids on segments 6 or 7 to 14 or 15, the longest not reaching to bases and apices of segments.

HEAD: Temple profile scarcely narrowed behind eyes, with curved outline; malar space subobsolete; clypeus slightly convex, medially often a trifle depressed toward apical margin; median field of face moderately protruding; carina oralis moderately raised.

THORAX: Anterior 1/3 of notauli pronounced; sternaui indicated; scutellum moderately convex and somewhat raised above postscutellum; carination of propodeum complete, the area superomedia usually about as long as wide; costulae oblique.

ABDOMEN: Postpetiole shiny and almost smooth; gastrocoeli indicated by rugosity only; thyridia kidney shaped or short oval, distinct and rather obtrusive by light color, contrasting with black basic color; sculpture of 2nd and 3rd tergite rather different from the similar male of *vinnulus*: extremely finely coriaceous, with moderately dense, fine and shallow puncturation on the 2nd, still finer and shallower, indistinct puncturation on the 3rd tergite; hypopygium triangularly projecting.



Map 78. *Cratichneumon paraparatus* Heinrich

DISTRIBUTION (map 78): From southern Maine to northern Florida, west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 7 males, Ouachita State Park, 13-23-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: Gainesville, 5 males, 18-V-1958-18-IV-1963 (1 male, 27-IV-1955 at *Melilotus alba*), H. V. Weems, Jr. (FSCA); 2 females, 1 male, 3-V-1968, G. Heinrich. Clay Co.: 1 female, Gold Head Branch State Park, 25-IV-1971, G. Heinrich. Jackson Co.: 1 male, Caverns State Park, 23-V-1966, H. V. Weems, Jr. Leon Co.: 8 males, Tall Timbers Research Station, 7-17-V-1968, G. Heinrich. GEORGIA. Monroe Co.: Forsyth, 1 female, 18-31-X-1970, 1 male, 5-VI-1971, 1 female, 7-17-VIII-1971, F. Naumann. LOUISIANA. Evangeline Co.: Bayou Chicot, 2 females, 2 males, 11-VIII-1-IX-1971, 1 female, 3 males, 22-29-III-1972, all D. Shaneck; Chicot State Park, 2 females, 24-29-V-1971, G. Heinrich. MISSISSIPPI. Yalobusha Co.: 1 male, Water Valley, 29-IX-5-X-1970, M. Horan. All specimens in CGH II unless otherwise noted.

22a. *Cratichneumon paratus paratus* (Say)

Ichneumon paratus Say, 1828:68, male.

Ichneumon annulipes Cresson, 1864:170, female.

Cratichneumon paratus paratus, Heinrich, 1961:136-137, female, male.

Holotypes: *Ichneumon paratus*, male, Indiana; lost. *Ichneumon annulipes*, female, Delaware; not located. Neotype: male, "Quebec, Canada, Gatineau, 19.VI.1956;" USNM; (present designation).

SYSTEMATICS: The 2nd species of the *paratus* group, most closely related to *paraparatus* Heinrich and to *floridensis* Heinrich. Agrees in structure generally with *floridensis*, but females differ clearly by the sculpture of the 2nd tergite which, although alutaceous and fine, shows a very fine, moderately dense puncturation on the basal 1/2. Females differ from *paraparatus* in color by lack of ivory markings on orbits, propodeum, coxae III, and particularly on postpetiole; they differ also slightly in structure by a trifle stouter basal segments of flagellum, tarsi III and femora III.

Males are distinguished chromatically by basally and apically black tibiae III, white flagellar annulus, and usually black, yellow-and/or orange-banded abdomen. Decisive for the distinction from the rather similar *vinnulus* male is the markedly finer and sparser puncturation of the 2nd and particularly the 3rd tergite.

As in *vinnulus* and *floridensis* the variability in size is very high in both sexes; there is also a high degree of individual and geographical chromatic variability in both sexes.

FEMALE: Length 5-10 mm. Basic color of head, thorax, coxae, and femora black, median lobe of mesoscutum sometimes more or less extensively ferruginous; tibiae III with clearly-defined, ivory annulus beyond base, black on dorsal side before and beyond ivory section; 1st, or 1st and 2nd segment of tarsi III blackish infuscated; scutellum always ivory, pronotal ridge sometimes; the orbits, declivity of propodeum, mesoscutum, and postpetiole never ivory marked; abdomen uniformly red brown or orange ferruginous; flagellum with white annulus.

FLAGELLUM: Filiform, stout, not or slightly widened beyond middle, with 25-30 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 6th square, the widest (in large specimens) up to 1.5 times as wide as long on the flat side.

HEAD: Temple profile barely narrowed behind eyes, cheek profile very slightly narrowed toward mandible base, both with slightly curved outlines; cheeks wide in lateral view and strongly convex, glossy with sparse puncturation; malar space nearly as

long as width of mandible base; median field of face moderately protruding.

THORAX: Mesoscutum rather flat, glossy (more so in southern subspecies), moderately densely punctured; notauli basally indicated; scutellum flat; horizontal part of propodeum medially slightly shorter than area postero-media; area superomedia and area basalis usually confluent; mesopleura coarsely and densely reticulate rugose; sternauli pronounced.

LEGS: Femora III very stout and short; coxae III ventrally densely punctured, very finely coriaceous between punctures, with distinct scopa.

ABDOMEN: Postpetiole densely and finely irregularly rugose and coriaceous; 2nd and 3rd tergites very finely coriaceous and subopaque, the 2nd tergite with moderately dense, microscopic puncturation (clearly visible at 30 times magnification) on anterior 1/2; gastrocoeli and thyridia weakly indicated.

MALE: Length 9-13 mm. Head ivory, the following black: antennal cavities, middle of frons, ocellar and occipital regions; mesoscutum with median ivory mark, the basic color black; also ivory are: collare, pronotal ridge and base, subalarum, scutellum, postscutellum, prosternum apically or predominantly, exterior belt of prepectus, mesosternum partially to entirely, mesopleura almost entirely, carinal triangle, and part or all of the declivity of propodeum; the metapleura black, the areae coxales, basalis, superoexternae, and dentiparae always black, the area superomedia usually black; 1st tergite usually black with apical yellow band, and usually yellow base; 2nd tergite yellow, with bipartite, irregular, median black mark, the 3rd tergite with basal black band of variable extent, the 4th usually with narrow, apical, yellowish band; tergites 5-7 blackish, gradually shading into brown toward apex of abdomen; femora III and coxae III black in northern subspecies, orange in southern subspecies (the coxae III orange or ivory); tibiae III always ivory, narrowly black at base, broadly at apex; all trochanters and all tarsi and the coxae I and II ivory, the metatarsus III usually blackish infuscated in northern populations, rarely in southern populations; flagellum black, ventrally pale ochreous or brownish, with complete white annulus on segments 12 or 13 or 16 to 19 or 20; scape ventrally ivory.

FLAGELLUM: With 30-36 segments and with bacilliform tyloids on segments 4 or 5 to 13 or 14 or 15.

HEAD: Temple profile slightly narrowed behind eyes, with curved outlines; malar space obsolete; clypeus without apico-median impression, a trifle convex; median field of face moderately protruding.

THORAX: Anterior 1/3 of notauli quite distinct; mesoscutum shiny, fairly coarsely and moderately densely punctured; scutellum slightly raised above postscutellum.

ABDOMEN: Postpetiole finely coriaceous to almost smooth; gastrocoeli indicated only by irregular rugosity, the thyridia distinct, approximately twice as wide as long; 2nd tergite finely and moderately densely punctured, coriaceous between punctures, the 3rd tergite coriaceous, with very fine and shallow, microscopic puncturation, subopaque.

DISTRIBUTION: Quebec, Maine, Michigan, Indiana and south at least to New York and probably to Pennsylvania.

22b. *Cratichneumon paratus pusillus* (Cresson)

Ichneumon pusillus Cresson, 1864:171, female.

Cratichneumon paratus, Townes and Townes, 1951:288, female; partim.

Cratichneumon pusillus, Heinrich, 1959b:213, female.

Cratichneumon paratus pusillus, Heinrich, 1961:137, female.

Holotype: *Ichneumon pusillus* (Cresson), female, Delaware; ANS.

FEMALE: Intermediate between nominate form and *C. p. pseudovinnulus* Heinrich; mesoscutum uniformly ferruginous; pleura, sterna, and propodeum predominantly dark brown or red brown; at least femora III, sometimes all femora and coxae ferruginous.

DISTRIBUTION: Delaware and Virginia.

22c. *Cratichneumon paratus pseudovinnulus* Heinrich
Map 79

Cratichneumon paratus pseudovinnulus Heinrich, 1961:137-138, female, male.

Holotype: female, North Carolina; CGH II. Allotype: male, North Carolina; CGH II.

SYSTEMATICS: This is a very distinct form, which could just as well be considered a full species. It is the most common form of the genus *Cratichneumon* throughout the entire southeastern region. Females as well as males are considerably different chromatically from *paratus paratus*, but are nearly congruent with the latter in sculpture and

structure, except that in females of *p. pseudovinnulus* the mesoscutum seems to be more flat, with polished and more glossy sculpture between punctures; femora III seem to be a trifle less stout. The association of sexes can be regarded as secure, as females and males have been collected together and in corresponding numbers many times in many places.

FEMALE: Almost entirely orange ferruginous, the mesoscutum a shade darker than the rest; the following ivory: collare, pronotal ridge narrowly (in parts or for entire length), subalarum, scutellum, postscutellum, coxae and trochanters I and II (the coxae usually orange tinged), 1st trochanters III, and an annulus beyond base of all tibiae; the following black: usually exterior sutures of mesoscutum narrowly, base of prosternum, prepectus partially to entirely, median furrow of mesosternum, and a longitudinal band on each side of the mesosternum (rarely the mesosternum to sternauli almost entirely), basal furrow of scutellum, axillary troughs, basal furrow of propodeum, sometimes areae coxales partially, and sometimes a small, narrow band below subalarum; rarely tibiae III blackish infuscated before and behind ivory mark on dorsal side.

MALE: Similar to the male of *vinnulus* by the ivory color of tibiae III with black base and apex, and by the black, orange and ivory-banded abdomen, but in most specimens readily recognizable by the ivory and/or orange (instead of black) basic color of metapleura and of entire areae spiraculiferae. Specimens with partially black areae metapleurales occur occasionally, in which case the fine sculpture of the 3rd tergite (with only extremely fine and shallow puncturation) offers the distinctive character. Mesoscutum varying from black to partially or entirely orange, always with median ivory mark; propodeum ivory or ivory and orange in combination; only the following black: areae superoexternae, basalis, dentiparae, coxales, and often also area superomedia, sometimes anterior and inferior part of areae metapleurales; mesopleura predominantly ivory, including speculum, with only restricted black band along upper margin, femora III always red, usually with black tip, femora I and II orange; tarsi III ivory, sometimes metatarsus III partially infuscated; coxae III usually orange, ivory on ventral side, with dorso-apical black mark, varying sometimes to ivory with more or less extensively black exterior side; abdomen orange, the 1st tergite usually black, varying to partially or entirely orange, with apical

ivory band; tergites 2 and 3, sometimes also 4, with basal bands or markings of very variable extent, apically usually ivory tinged, orange between black and ivory sections; tergites 4 or 5 to 7 orange; in some variations abdomen entirely or almost entirely orange.

DISTRIBUTION (map 79): North Carolina south to Georgia, west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 2 females, 1 male, Ouachita State Park, 9-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Banks Co.: 22 females, 3 males, Homer, G. Heinrich, R. Duffield. Clarke Co.: 21 males, Athens, 27-VII-21-IX, H. Hermann. Monroe Co.: Forsyth, 18 females, 56 males, 9-IV-31-X-1968-1971 (all months inclusive), G. Heinrich, F. Naumann. LOUISIANA. Avoyelles Co.: 2 females, 8 males, Eola, 23-30-III-1972, D. Shaneck. Evangeline Co.: 15 females, 25 males, Bayou Chicot, 13-III-17-XI-1971-1972, G. Heinrich, D. Shaneck; 2 females, 7 males, Chicot State Park, 22-V-28-VII, G. Heinrich, D. Shaneck. Webster Co.: 2 females, Bistineau State Park, 14-17-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 2 females, 13 males, 14-VII-30-X-1970 (all months inclusive), C. Sartor. Yalobusha Co.: 38 females, 47 males, Water Valley, 23-III-23-XI-1970-1971 (all months inclusive), M. Horan. NORTH CAROLINA. 6 females, 5 males, Raleigh, 10-VI-1951, G. Heinrich. TENNESSEE. Henderson Co.: 1

female, Natchez Trail State Park, 13-17-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

23. *Cratichneumon floridensis*

Heinrich

Plate 2, Map 80

Cratichneumon floridensis Heinrich, 1972: 181-183, female, male.

Holotype: female, Florida; CGH II. Allotype: male, Florida; CGH II.

SYSTEMATICS: The 3rd species of the *paratus* group, with impunctate, alutaceous 2nd tergite. It replaces *paratus pseudovinnulus* Heinrich (inhabiting the Lower and Upper Austral Zones) in Florida. The 2 species could be considered as associated subspecies, but their differentiation in color as well as in sculpture is considerable and seems to call for specific status. The fact, that no intergradation of the 2 forms has been observed, although their ranges practically touch each other supports the hypothesis of specific separation.

Females are distinguished from *paratus pseudovinnulus* particularly by the vivid blood-red basic color of body and legs, sharply contrasting with the dorsally coal-black tibiae III with clear white annulus beyond base. The males differ similarly, except the abdomen, as a rule, lacks the black- and yellow-banded pattern of anterior tergites so characteristic for *paratus pseudovinnulus* males. In both sexes the sculpture of anterior tergites is still finer than *paratus pseudovinnulus* and distinctly more glossy.

FEMALE: Length 5-11 mm. Head uniformly blood red, without ivory and black marks; thorax blood red, the following black: exterior sutures around mesoscutum narrowly, basal furrow and lateral slopes of scutellum, axillary troughs, basal furrow of propodeum all around, areae coxales more or less extensively, base of prosternum, median furrow of mesosternum, short band below subalarum, sometimes a mark on middle of pronotum; the following white: collare, usually the extreme end of pronotal ridge, scutellum, postscutellum, usually a mark on subalarum, and rarely more or less distinct marks on areae posteroexternae; abdomen uniformly blood red; legs ferruginous, the femora III blood red, rarely with black tip; tibiae III coal black, with complete white annulus beyond base; tibiae I and II with median white mark on dorsal side; trochanters I and II white, coxae I and II and trochanters III orange-tinged white; tarsi III pale orange ferruginous varying to whitish,



Map 79. *Cratichneumon paratus pseudovinnulus* Heinrich

the metatarsus III basally more or less extensively infuscated; flagellum black, with complete white annulus on segments 8 to 12 or 14 or 15; scape uniformly red.

FLAGELLUM: Filiform, rather short, a trifle narrowed toward base, not narrowed toward apex, with 25-29 segments, the 1st about 1.5 times as long as apically wide, the 6th in lateral view square, the widest on the flat side about 1.3 times as wide as long.

HEAD: Temple profile barely narrowed behind eyes, slightly curved; cheek profile slightly narrowed toward mandibles, nearly straight; malar space nearly as long as width of mandible base; cheeks in lateral view rather wide and strongly convex, polished, with scattered punctures; median field of face distinctly protruding; face with distinct, moderately dense puncturation, clypeus with sparse puncturation.

THORAX: Mesoscutum polished, with sparse puncturation; notauli indicated at base only; scutellum flat; area posteromedia nearly as long as horizontal part of propodeum medially; carination of propodeum distinct and complete, only area superomedia and area basalis confluent.

LEGS: Stout, femora thick; femora III in lateral view about 3.5 times as long as medially wide; coxae III with scopa.

ABDOMEN: Postpetiole shiny and almost smooth; tergites 2 and 3 with extremely fine, coriaceous sculpture and, in contrast to *paratus pseudovinnulus*, distinctly shiny, the 2nd tergite on basal part usually with a few, scattered, microscopic punctures.

MALE: Length 6-12 mm. Head white, the following black: antennal cavities, middle of frons broadly, ocellar and occipital regions, and mandible teeth; thorax black, red and white in somewhat variable combination; mesoscutum black, varying to medially or sometimes even to predominantly blood red, always with median white mark; the following white: prosternum, mesosternum (often except black mark before coxae II), broad exterior belt all around prepectus, collare, pronotal ridge and base, subalarum, tegulae, scutellum, postscutellum, carinal triangle, more than lower 1/2 of mesopleura, speculum, and on propodeum at least areae posteroexternae, usually also upper part or most of area posteromedia, apical part of areae spiraculiferae, and apical region of areae metapleurales; basic color of propodeum varying from black to ferruginous red; sometimes also a ferruginous band on mesopleura, adjacent to upper border of white part; abdomen blood red, usually

petiole dorsally and ventrally more or less extensively black and postpetiole with apical whitish band; often the 2nd tergite, rarely also the 3rd, with more or less extensive basal infuscations and/or ill-defined apical whitish bands; legs orange ferruginous including coxae III, the femora III blood red, usually apically black; black also are: always the base of tibiae III narrowly and their apex on dorsal side broadly, often an apical mark on exterior dorsal side of coxae III; the following white: coxae I and II, all trochanters, ring on tibiae III between black base and apex, tibiae I and II medially on dorsal side; all tarsi whitish, the metatarsus III usually basally or more extensively infuscated; flagellum black, with complete white annulus on segments 12 or 13 or 14 to 18 or 20 or 21, ventrally usually dark brownish; scape ventrally white.

FLAGELLUM: With 29-34 segments and with nearly bacilliform tyloids on segments 4 or 5 to 13 or 14 or 15, the longest, on segments 8-11, reaching fairly close to bases and apices of segments.

DISTRIBUTION (map 80): FLORIDA: Alachua Co.: Gainesville, 1 male, 15-III-1925, D. Bates, 1 male, 18-V-1958, H. V. Weems, Jr., 2 males, 18-IV-1947, H. Weems, Jr., 3 females, 2 males, 2-V-1968, G. Heinrich. Brevard Co.: 1 male, 24-III-1954, H. Weems, Jr. Citrus Co.: 1 female, Floral City, 16-IV-1965, V. Daniel.



Map 80. *Cratichneumon floridensis* Heinrich

Clay Co.: 2 females, 5 males, Gold Head Branch State Park, 22-IV-3-V-1971, G. Heinrich, D. Radtke, F. Zeiger. 1 male, Orange State Park, 18-IV-1971, G. Heinrich. Duval Co.: 2 females, 2 males, Jacksonville, 8-12-V-1971, F. Zeiger. Hamilton Co.: 1 male, Jasper, 16-IV-1971, G. Heinrich. Highlands Co.: 5 females, 12 males, Highlands Hammock State Park, 24-IV-1968, 14-VIII-30-IX-1969, G. Heinrich, D. Radtke, R. Miller; 18 females, 35 males, Archbold Biological Station, II-VI-1967-1968, G. Heinrich. Lake Co.: 1 female, Mt. Dora, 17-II, H. Weems, Jr. Lee Co.: 4 females, 5 males, Fort Myers, III-V-1967-1968, G. Heinrich. Leon Co.: Tall Timbers Research Station, 17-V-1968, G. Heinrich. Orange Co.: 2 males, Orlando, III-1944, G. Bohart. Putnam Co.: 1 female, 2 males, Red Water Lake, 26-28-VIII-1969, G. Heinrich. In FSCA & CGHII.

**24. *Cratichneumon vescus*
(Provancher)
Map 81**

Ichneumon vescus Provancher, 1877:9, male.

Cratichneumon vescus Heinrich, 1961:152-153, female, male.

Holotype: male, Quebec; PMQ (No. 685). Neallotype: female, Maine; CGH II.

SYSTEMATICS: A small species; females are distinguished by the combination of the following characters: (1) ferruginous and black color without any white or yellow markings; (2) weak and incomplete carination of horizontal part of propodeum; (3) presence of small scopa on coxae III; (4) densely and finely punctured 2nd tergite; (5) relatively wide, transverse thyridia. Males are readily identifiable by their color pattern, particularly by absence of white antennal annulus and by the black abdomen with apical yellow bands on tergites 1-3.

The association of sexes was confirmed by rearing of broad series of males and females from the same host in Manitoba.

The species cannot be considered as a component of the southeastern fauna as there is only 1 record from the mountains of the most northern region of Georgia.

FEMALE (northern specimens): Length 7-9 mm. Without white or yellow markings; head and thorax ferruginous brown with black pattern of variable extent; the following are usually ferruginous brown: frons, vertex, outer orbits, clypeus, face (usually except blackish area on each side), mesoscutum, scutellum, horizontal part and declivity of propodeum and middle of mesopleura more or less extensively; coxae I

and II and femora I and II varying from black to partially or entirely ferruginous brown; coxae III and femora III black, the latter rarely reddish brown; tibiae III fulvous, broadly black apically; tibiae and tarsi I and II obscure yellowish, the tarsi III reddish brown, their basal 2 or 3 segments predominantly blackish infuscated; abdomen ferruginous brown, petiole blackish; flagellum black, with complete white annulus on segments 7 to 11 or 12; scape ventrally ferruginous.

FLAGELLUM: Filiform, distinctly widened beyond middle, tapering somewhat toward base, with 24-27 segments, the 1st about 1.3 times as long as wide, in lateral view the 5th square, the widest nearly twice as wide as long.

HEAD: Temple profile and cheek profile distinctly narrowed behind eyes and toward mandible base respectively, with slightly curved outlines; malar space a little shorter than width of mandible base.

THORAX: Mesoscutum and scutellum flat, the former finely and densely punctured, shiny between punctures; notauli faintly indicated at base only; propodeum alutaceous, subopaque; costulae, lateral carinae of area basalis and area posteromedia and anterior carina of area superomedia obsolete.

LEGS: Femora stout; coxae III ventrally finely and densely punctured, with small blackish scopa.

ABDOMEN: Postpetiole with fairly distinct median field, finely coriaceous rugose; 2nd tergite densely and finely punctured; thyridia distinct, relatively wide transversely; 3rd tergite alutaceous with some microscopic punctures on basal part.

MALE: Length 9-13 mm. Head and thorax black, the following ivory: mandibles except teeth, clypeus, face, orbits broadly around eyes including malar space, collare, pronotal ridge, pronotal base partially or entirely, subalarum, tegulae, scutellum, postscutellum, areae posteroexternae together with apices of areae dentiparae, sometimes also a small median mark on mesoscutum and a mark on mesopleuron; legs ivory, the following black: femora I and II dorsally, femora III uniformly, apex of tibiae III broadly, coxae III (sometimes more or less ivory ventrally); segment 1, often also 2 of tarsi III blackish infuscated except basally and apically; abdomen black, tergites 1-3 with broad apical yellow bands, 2nd tergite often yellow at base also; tergites 4-7 usually with narrow apical dark reddish margins;

flagellum black without annulus, ventrally pale ochreous, scape ventrally ivory.

FLAGELLUM: With 30-34 segments and with elongate-oval, nearly-bacilliform tyloids on segments 4 or 5 to 10 or 11, the longest covering about the basal 3/4 of the length of segments.

DISTRIBUTION (map 81): Transcontinental in Canadian Zone; in eastern North America recorded south to northern Georgia. GEORGIA. Madison Co.: 1 male, Chattahoochee State Park, 19-V-1970, L. Hermann. CGH II.

HOST: *Protoboarmia porcelaria* (Gn.).

25a. *Cratichneumon flavipectus* flavipectus (Provancher)

Cryptus flavipectus Provancher, 1879:134, "female" = male.

Ichneumon pygmaeus Davis, 1897:350, female (name preocc.)

Cratichneumon ericaceus Townes, 1944:335 (new name). Townes and Townes, 1951:288, female.

Cratichneumon flavipectus, Heinrich, 1961:162-164, female, male.

Holotypes: *Cryptus flavipectus*, male, Quebec; PMQ. *Ichneumon pygmaeus*, female, New Hampshire; ANS.

SYSTEMATICS: Females of this species are readily identifiable by the combination of

the following characters: (1) 2nd tergite not punctured, with very fine, alutaceous sculpture; (2) abdomen elongate and rather slender; (3) flagellum exactly filliform, slender, not at all widened beyond middle, slightly narrowed toward base; (4) coxae III without scopa; (5) metatarsus III more or less extensively infuscated.

Males are distinguished particularly by (1) the convex frons, (2) very small, narrowly-oval tyloids, approaching a bacilliform shape, (3) the blackish-infuscated anterior segments of tarsi III, and (4) by the fine sculpture of 2nd tergite.

The northern populations of this species display much more extensive black markings on head and thorax than the southern specimens, particularly in females; this constant difference has been considered to be subspecific.

The smallest specimens of this species represent the very smallest forms of the genus.

FEMALE: Length 4-8 mm. Red brown, the following black: antennal cavities, ocellar and occipital regions, prosternum, mesosternum, prepectus, propleura extensively, mesoscutum partially to predominantly, and parts of propodeum and of mesopleura; scutellum and postscutellum always yellow; head without ivory or yellow markings; metatarsus III, apex of tibiae III, and usually also apex of femora III blackish infuscated; no white or ivory marks on legs and abdomen; abdomen ferruginous or orange ferruginous, sometimes anterior tergites with blackish-infused basal bands; flagellum black, with dorsal white annulus on segments 7 or 8 to 11 or 12; basal segments ventrally usually more or less extensively brownish, varying to entirely orange; scape ventrally ferruginous.

FLAGELLUM: Exactly filiform, not at all widened beyond middle, slightly narrowed toward base, with 22-24 segments, the first 1.5 to 2 times as long as apically wide, in lateral view the 7th square.

HEAD: Temple profile distinctly narrowed behind eyes, curved; cheek profile distinctly narrowed toward mandible base, almost straight; malar space fully as long as width of mandible base; frons between antennal cavity and ocellus slightly convex, coriaceous and very finely punctured.

THORAX: Mesoscutum very finely and moderately densely punctured, finely coriaceous between punctures, slightly shiny; notauli indicated at the base only; horizontal



Map 81. *Cratichneumon vescus* (Provancher)

part of propodeum about as long as declivity; carination weak but complete, except area basalis and area superomedia usually confluent; horizontal part very finely and densely rugose punctate and subopaque.

LEGS: Moderately slender; coxae III ventrally finely and densely punctured, without scopa.

ABDOMEN: Slender, somewhat elongate, the 2nd tergite longer than apically wide; postpetiole very finely, irregularly rugose; 2nd tergite alutaceous, subopaque, without puncturation; gastrocoeli obsolete, thyridia recognizable.

MALE: Length 6-9 mm. Head white, the following black: always ocellar and occipital regions, antennal cavities and middle of frons; mesoscutum black, with median white mark; axillary troughs black; horizontal part of propodeum at least basally, black, apically ferruginous, sometimes entirely black, propleura and metapleura basally more or less extensively black, ferruginous beyond black base, varying to entirely ferruginous; the following ivory: collare, pronotal ridge and base, prosternum, prepectus except base, mesosternum, most of mesopleura including speculum, sometimes also propleura, subalarum, tegulae, scutellum, postscutellum, declivity of propodeum, and apical region of metapleura; all femora and basic color of coxae III and of tibiae III orange ferruginous; tibiae III toward apex more or less extensively blackish infuscated, ivory tinged toward base; coxae III with black, dorso-apical mark, ventrally ivory; apex of femora III often black; all tarsi ivory, except segments 1 or 1 and 2 of tarsi III black or blackish; ivory are: all trochanters, coxae I and II, tibiae I and II dorsally, and tarsi I and II; abdomen usually uniformly orange ferruginous, except 1st tergite; 1st tergite, or at least petiole, black, postpetiole usually with apical ivory band; rarely tergites 2-5 with basal blackish-infuscated bands or bipartite marks; flagellum black, ventrally pale ochreous, with complete white annulus on segments 13 or 14 to 17; scape ventrally ivory.

FLAGELLUM: With 27-30 segments and with very small, narrowly oval (close to bacilliform) tyloids on segments 4 or 5 to 13.

HEAD: Temple profile markedly narrowed behind eyes, with curved outline; frons convex; malar space subobsolete; median field of face distinctly protruding.

THORAX: Mesoscutum strongly convex; anterior 1/3 of notauli distinct; carination of propodeum distinct and complete; area

superomedia as wide as long, or somewhat wider than long.

ABDOMEN: Slender; postpetiole glossy; 2nd tergite finely coriaceous, without puncturation.

DISTRIBUTION: From Quebec, Ontario, New Hampshire, and Maine; the southern limits of the range not known.

25b. *Cratichneumon flavipectus mississippi* Heinrich
Map 82

Cratichneumon flavipectus mississippi Heinrich, 1971:989-990, female, male.

Holotype: female, Mississippi; CGH II.
Allotype: male, Mississippi; CGH II.

FEMALE: Differs from the nominate form rather strikingly by the almost uniformly ferruginous-orange color of head and thorax; head without black markings; black on thorax reduced to small markings on base of prosternum, base of prepectus, area below subalarum, and sometimes on middle of pronotum; black are also (as in nominate form) basal furrows of scutellum and of propodeum, axillary troughs, and sometimes areae coxales; femora and tibiae III often apically not black.

MALE: Only slightly differentiated from the nominate form by greater extent of white color on head and pleura; head usually with white antennal cavities and/or entirely



Map 82. *Cratichneumon flavipectus mississippi* Heinrich

white frons; propleura sometimes entirely white; black on mesopleura often reduced to a small mark below subalarum.

DISTRIBUTION (map 82): From the following states: ARKANSAS. Garland Co.: 2 females, 4 males, Ouachita State Park, 9-16-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 2 females, 7 males, Gold Head Branch State Park, 19-25-IV-2-V-1972, G. Heinrich. GEORGIA. Monroe Co.: 3 females, 3 males, Forsyth, 20-V-31-X-1968-1971, G. Heinrich, F. Naumann. LOUISIANA. Evangeline Co.: 4 females, Bayou Chicot, 28-VII-8-IX-1971, D. Shaneck; 6 females, 2 males, Chicot State Park, 26-V-23-XI-1971, G. Heinrich, D. Shaneck. Natchitoches Co.: 1 male, Natchitoches, 17-VI-1971, G. Heinrich; 1 male, Powhatan, 18-VI-1971, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 1 female, 1 male, Starkville, 26-IX-10-X-1970, 7-13-VIII-1971, C. Sartor. Yalobusha Co.: 25 females, 1 male, Water Valley, 8-VII-16-XI-1970, M. Horan. TENNESSEE. Henderson Co.: 1 female, 3 males Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. In CGH II.

**26a. *Cratichneumon facetus*
facetus (Cresson)**

Ichneumon facetus Cresson, 1867:311, male.

Cratichneumon facetus, Townes and Townes, 1951:288, male. Heinrich, 1961:159-160, female, male.

Holotype: male, Virginia; ANS. Neallotype: female, Rhode Island; CHT.

SYSTEMATICS: Similar superficially to *flavipectus* Provancher, but distinguished in females particularly by the finely and densely punctured 2nd tergite and also by the vertical and frontal orbits always ivory marked, scutellum ivory, often ivory prescutellar carinae, never infuscated metatarsus III, and the less narrowed behind eyes temple profile. Males are well characterized in color by ivory prescutellar carinae and in addition a short ivory line in front of the prescutellar carinae, by never blackish-infuscated basal segments of tarsi III and tips of femora and tibiae III, and in addition by the row of tyloids already beginning on the 3rd or 4th flagellar segment.

FEMALE: Length 7-9 mm. Orange ferruginous, with restricted black markings on head and thorax; prosternum, prepectus, and mesosternum entirely or extensively black, as are also the antennal cavities, ocellar region, and propleura more or less extensively; scutellum ivory; propodeum, abdomen, all femora, tibiae, and tarsi, and

the coxae III always uniformly orange, without ivory, black, or infuscated parts; coxae and trochanters I and II orange-tinged ivory; flagellum black, with complete white annulus on segments 6 or 7 to 11 or 12; scape ferruginous, blackish on exterior side.

FLAGELLUM: Exactly filiform, not widened beyond middle, slightly tapering toward base, with 24-25 segments, the 1st 1.5 times as long as apically wide, in lateral view the 6th square.

HEAD: Temple profile barely narrowed behind eyes, distinctly curved; cheek profile distinctly narrowed toward mandible base, only slightly curved; malar space nearly as long as width of mandible base; face and frons evenly and densely punctured; frons below ocelli even, neither convex nor concave.

THORAX: Mesoscutum rather flat, nearly as wide as medially long, evenly and densely punctured, finely coriaceous between punctures; notauli weakly indicated at the extreme base only; sternauli distinct; propodeum evenly and densely rugose punctate and subopaque all over, with complete but weak carination; area superomedia hexagonal, narrowed in front, not sharply separated from area basalis; horizontal part medially almost as long as area postero-media.

LEGS: Stout; coxae III ventrally densely punctured, without scopae.

ABDOMEN: Postpetiole finely, irregularly rugose; 2nd tergite finely, evenly, and very densely punctured all over; gastrocoeli subobsolete, thyridia fairly distinct; 3rd tergite somewhat finer and less densely punctured than the 2nd.

MALE: Length 8-10 mm. Head white, the following black: antennal cavities, middle of frons narrowly, ocellar and occipital regions; mesoscutum ferruginous red, usually more or less extensively black at anterior border and in front of scutellum, and with narrowly black exterior margin; black are also: base of prepectus more or less extensively, a small mark below subalarum, sometimes very restricted markings on propleura, rarely a small mark in front of coxae III, always basal furrow of scutellum and axillary troughs; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae, scutellum, postscutellum, prescutellar carinae, short longitudinal lines in front of prescutellar carinae on sides of mesoscutum (behind tegulae), prosternum, mesosternum, mesopleura; uniformly orange are: propodeum, abdomen, legs III including coxae,

femora I and II, and basic color of propleura; ivory, or orange-tinged ivory are: coxae, trochanters, tibiae, and tarsi I and II, and trochanters III; propodeum sometimes also orange-tinged ivory; coxae III sometimes ventrally ivory and sometimes with black dorso-apical mark; flagellum black, ventrally orange yellow, with complete white annulus on segments 13 or 14 to 18 or 20; scape ventrally ivory.

FLAGELLUM: With 29-33 segments and with bacilliform to narrowly-oval tyloids on segments 3 or 4 to 13 or 14, the longest not reaching close to bases and apices of segments.

HEAD: Temple profile moderately narrowed behind eyes, with curved outline; malar space scarcely $1/3$ as long as width of mandible base; median field of face only slightly protruding; frons finely and sparsely punctured, finely coriaceous between punctures.

THORAX: Mesoscutum finely and densely punctured, moderately convex; notauli obsolete, indicated at the extreme base only; scutellum somewhat raised above post-scutellum; carination of propodeum weak, but complete; area superomedia about as wide as long.

ABDOMEN: Postpetiole smooth and shiny; 2nd and 3rd tergite finely and densely punctured; gastrocoeli obsolete; thyridia recognizable.

DISTRIBUTION: Michigan, Rhode Island, New York, and Virginia.

**26b. *Cratichneumon facetus astro-
riparius*, new subspecies**

Map 83

FEMALE: Differs from the northern nominate form by the complete absence or considerable reduction of black markings on the head and thorax; head, propleura, mesopleura, and mesosternum uniformly ferruginous orange, prepectus and prosternum varying from partially black to uniformly ferruginous.

MALE: Agrees with male of the nominate form.

Holotype: female, Mississippi, Yalobusha Co., Water Valley, 6-20-X-1970, M. Horan. Allotype: male, same data, 17-23-XI-1970. Paratypes: 5 females, same locality. All specimens in CGH II.

DISTRIBUTION (map 83): In addition to the type material I have seen the following: ARKANSAS. Garland Co.: 1 female, 1 male, Ouachita State Park, 14-15-V-1972, D.



Map 83. *Cratichneumon facetus asutroriparius*, n. subsp.

Shaneck. GEORGIA. Clarke Co.: 1 male, Athens, 7-21-IX-1970. LOUISIANA. Avoyelles Co.: 1 female, 6 males, Eola, 13-IV-18-VI-1972, D. Shaneck. Evangeline Co.: 6 males, Chicot State Park, 28-V-5-VI-1971, G. Heinrich. MISSISSIPPI. Yalobusha and Lafayette Cos.: Water Valley, 28 females, 28 males, 22-IV-3-XI-1970-1971, G. Heinrich, M. Horan. TENNESSEE. Henderson Co.: 3 males, 5 females, Natchez Trail State Park, 16-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

27. *Cratichneumon scitulus* (Cresson)
Map 84

Ischnus scitulus Cresson, 1864:193, male.

Ichneumon nanus Cresson, 1877:184, female (preocc.).

Amblyteles nanodes Cushman, 1925:388, female (new name).

Cratichneumon quintilis, Townes and Townes, 1951:289, female only.

Cratichneumon scitulus, Townes and Townes, 1951:289, male. Heinrich, 1961:154-156, female, male.

Holotypes: *Ischnus scitulus*, male, Illinois, and *Ichneumon nanus*, female, New York; ANS.

SYSTEMATICS: This again is a species of great complexity and with partially unsolved problems. It represents a group of rather small species, including *annulatus* (Pro-

vancher), and apparently several not yet described forms. Females of this group show the following, shared characters: (1) 2nd tergite distinctly, though finely punctured; (2) coxae III without scopa; (3) flagellum rather stout, exactly filiform; (4) tibiae III more or less extensively infuscated toward apex, shading into ivory toward base (in *annulatipes* the base of tibiae III often also infuscated, not so in other forms).

Males of *scitulus* are characterized by a moderately abbreviated propodeum with distinctly transverse area superomedia, and with the area posteromedia considerably longer than horizontal part medially. The specimens from Tennessee and Arkansas recorded below, agree well with the type.

The female *nanus* Cresson associated by Heinrich (1961) with *scitulus* Cresson, male, is distinguished by the combination of the following characters: (1) 2nd tergite distinctly, though finely, punctured; (2) coxae III without scopa; (3) propodeum moderately abbreviated, the horizontal part medially distinctly more than 1/2 as long as area posteromedia; (4) costulae and anterior bordering carina of area superomedia indistinct or obsolete, the space of area basalis, however, recognizable, in other words: area basalis not replaced by area superomedia (as in some similar species); (5) flagellum filiform, not or slightly widened beyond middle; (6) tibiae III only apically infuscated, not basally.

FEMALE: Length 7-8 mm. Head ferruginous, without ivory marks, sometimes antennal cavities and ocellar and occipital regions infuscated; thorax ferruginous, including scutellum, with the following black parts: prosternum, mesosternum medially, prepectus, propleura, band below subalarum, basal furrows of scutellum and of propodeum, axillary troughs, area coxalis, sometimes also adjacent parts of or entire area metapleuralis; legs ferruginous, the following black: femora III apically or entirely, tibiae III apically, coxae III laterally to sometimes almost entirely; all trochanters, tibiae and tarsi I and II, and tibiae III toward base pale orange to ivory-tinged orange; abdomen ferruginous; flagellum black, with complete white annulus on segments 7 or 8 to 12; scape ventrally ferruginous.

FLAGELLUM: Filiform, not or very slightly widened beyond middle, with 24-25 segments, the 1st about 1.3 times as long as apically wide, the 5th segment square.

HEAD: Temple profile somewhat narrowed behind eyes, with curved outline; cheek profile distinctly narrowed toward mandible base.

THORAX: Mesoscutum flat, finely and moderately densely punctured, glossy between punctures; notauli indicated at base only; propodeum as described above.

LEGS: Femora III moderately stout; coxae III ventrally rather densely punctured, finely coriaceous and shiny between punctures, without scopa.

ABDOMEN: Postpetiole finely coriaceous rugose; 2nd tergite distinctly and densely, though finely, punctured, coriaceous between punctures; 3rd tergite coriaceous and more finely punctured to beyond middle; thyridia recognizable.

MALE: (southeastern populations). Length 6-10 mm. Head white, the following black: antennal cavities, middle of frons, ocellar and occipital regions; thorax dark ferruginous, ivory, black, and orange; the following ivory: collare, pronotal ridge and base, subalarum, tegulae, scutellum, postscutellum, carinal triangle, areae posterolaterales (or declivity of propodeum almost entirely), prosternum except base, mesosternum, exterior belt of prepectus all around, about lower 1/2 of mesopleura (the ivory color shading gradually into the orange above); the following black: propleura, exterior margin of mesoscutum all around (sometimes mesoscutum more extensively), mark in front of coxae II on mesopleura, basal furrow of scutellum, axillary troughs, basal furrow of propodeum, more or less extensive band on upper section of mesopleura below subalarum, areae coxales, and usually areae metapleurales partially to entirely; area posteromedia usually infuscated along middle; rest of propodeum including basic color of area posteromedia orange, as is also basic color of upper part of mesopleura more or less extensively; all femora and the coxae III orange, the former extensively black toward apex, the latter varying to predominantly black and always ventrally ivory; ivory also are: all trochanters, coxae I and II, all tibiae (the tibiae III broadly black at apex), and all tarsi, the tarsi III orange tinged; abdomen orange, postpetiole, and sometimes 2nd tergite, apically ivory; flagellum black, ventrally pale ochreous, with complete white annulus on segments 12 or 13 or 14 to 18 or 19; scape ventrally ivory.

FLAGELLUM: With 28-30 segments and with elongate, bacilliform tyloids on segments 4 or 5 to 12 or 13, the longest, on

segments 9-11, not reaching to bases and apices of segments.

HEAD: Temple profile somewhat narrowed behind eyes, curved; malar space obsolete; median field of face moderately protruding.

THORAX: Mesoscutum fairly densely punctured, glossy between punctures, convex, slightly longer than wide; anterior 1/3 of notauli distinct; propodeum abbreviated, the area superomedia wider than long; area posteromedia nearly twice as long as horizontal part medially.

ABDOMEN: Postpetiole shiny, nearly smooth; 2nd tergite finely and densely punctured; gastrocoeli subobsolete, thyridia recognizable.

VARIABILITY: Male: The specimens from Tennessee and Arkansas are rather homogenous in color, and they also agree with the type specimen. Northern populations display a very high degree of individual variability, the basic color of the thorax varying in specimens from Maine (in a parallel to *w-album* (Cresson), from predominantly ferruginous to entirely black; the ivory color of the mesosternum, in typical specimens extending up to almost the middle on the mesopleuron, often is restricted to the mesosternum only, sometimes to a mark on mesosternum or (very rarely) entirely absent. Since I presume that all these variations represent indeed a single species, a sub-specific division was not attempted.

DISTRIBUTION (map 84): From Prince Edward Island, Quebec and Ontario (Heinrich 1961) west to Continental Divide (Townes and Townes, 1951), south to Tennessee and Arkansas (new records). ARKANSAS. Garland Co.: 2 males, ? 1 female, Ouachita State Park, 11-18-V-1972, G. Heinrich, D. Shaneck. TENNESSEE. Henderson Co.: 8 males, Natchez Trail State Park, 7-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

**28a. *Cratichneumon volens*
volens (Cresson)
Fig 38, Map 85**

Ischnus volens Cresson, 1864:192, male.

Ichneumon brevipennis var. *obsoletus* Riley, 1877:55, female.

Cratichneumon volens, Townes and Townes, 1951:289.

Cratichneumon brevipennis, Heinrich, 1961:170, (partim), male.

?*Cratichneumon howdeni* Heinrich, 1961:172, female.



Map 84. *Cratichneumon scitulus* (Cresson)

Types: *Ischnus volens*, male, Virginia; ANS. *Ichneumon brevipennis* var. *obsoletus*, female; lost. *Cratichneumon howdeni*, female, North Carolina; CHT.

SYSTEMATICS: *Cratichneumon volens* is a member of an aberrant group of forms of this genus, which are particularly distinguished from all other species by prominent wrinkles on the frons; these wrinkles (fig. 38) run from about level with lower ocellus down to upper margin of antennal cavity, the median ones converging downward; they are rather strongly developed in females, but less distinct in males. Males are fairly numerous in collections, while the females are very hard to obtain and are known so far from only a few specimens; this is the reason why the taxonomic interrelationship and the

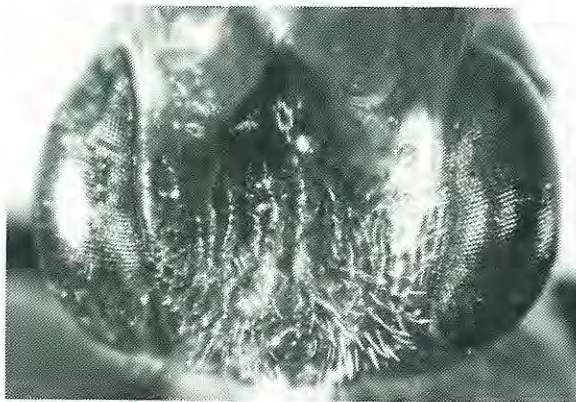


Fig. 38. *Cratichneumon volens volens* Cresson (female). Head, frontal view.

status of the forms involved still remain hypothetical.

For the deduction of my present point of view, derived from a reexamination of the types and of the material available to me, females and males will be discussed separately.

The oldest of the 3 names applied within this group is *Ichneumon brevipennis* Cresson (1864) based on 1 female from Colorado, the only specimen recorded from the West. My former treatment of the group (1961:170-172) was based on the hypothesis that: (1) the few females then known from northeastern North America and the type of *brevipennis*, all without white flagellar annulus, belonged to the same species; (2) *Ischnus volens*, male, described from Virginia, also in 1864, was the associated male; and (3) a female at hand from the southeast, distinguished by a very broad and almost complete, white flagellar annulus represented a distinct species which I named *howdeni* (Heinrich, 1961). Re-examining the type of *brevipennis* I found that it differs from all known eastern females in the structure of the propodeum, with the combined areae superomedia and basalis being distinctly wider than long and the area posteromedia being very wide and scarcely concave; whether this character represents an odd individual or a specific distinction remains unknown. Until additional western females, and particularly associated males are discovered, which may perhaps prove otherwise, it seems preferable to alter my hypothesis of 1961 and to confine the name *brevipennis* to the western population.

From the east a fair quantity of males is at hand, from a variety of localities situated between Michigan and Maine in the north and central Florida in the south. I was not able to find tangible structural differences between the populations from Maine and from Florida. There are, however, marked chromatic distinctions, the former being considerably more melanistic than the latter, as will be evident on the table of distribution of black, following below. I am separating the 2 forms in this treatment as associated subspecies. As the type of *Ischnus volens* from Virginia was found to be identical with the population from Florida, the latter has to be regarded as the nominate form, while the northeastern variant will be named as a new subspecies.

From Maine southward the extent of black pattern in males apparently decreases gradually; a population from Maryland (CHT) can, however, still be included in the

northeastern subspecies, except for the fact that in the 3 specimens at hand the white flagellar annulus (present in all my 8 specimens from Maine) is lacking; whether this is a constant feature, possibly indicating the existence of a 3rd eastern subspecies, needs further research. Sporadically males without flagellar annulus also have been collected in New York (Troy, CHT, and Fishers, CGH II).

From the southeast only 2 females are known, both from Carolina, both representing the form described as *howdeni* Heinrich (1961); these females differ rather strikingly from northeastern females and also from the type of *brevipennis* by the presence of a wide white flagellar annulus and also, though only slightly, by slightly longer and more narrowed cheek profile and by slightly longer basal segments of flagellum. I now strongly suspect that they represent the other sex of *volens* and am therefore synonymizing *howdeni* Heinrich tentatively with *volens*. The future discovery of a female of the Florida population may confirm or disprove this hypothesis.

The following key to the forms of the *brevipennis* group is the result of the above-mentioned deductions:

FEMALES

1. Flagellum with very distinct, broad, practically complete white annulus; head and thorax without black marks, except median furrow of mesosternum and middle of prepectus; lower 1/2 of cheeks in lateral view barely convex in transverse or longitudinal direction, the cheek profile in front view therefore straight. (Length 13 mm).
..... *volens volens* (Cresson)
- Flagellum without white annulus; thorax tending to display some melanistic pattern, in allotype prosternum, middle of propleura, and broad middle of mesopleura black; lower 1/2 of cheeks in lateral view distinctly convex in both directions, the cheek profile in front view therefore slightly curved toward mandibles. (Length 12 mm).
..... *volens borealis*, new subspecies

MALES

1. Black marks on head and thorax considerably more restricted than in alternative subspecies, particularly on head, mesoscutum, mesopleura, metapleura, and dorsal side of petiole, which parts are predominantly or uniformly bright

orange ferruginous, the mesopleura except a black mark before coxae II and a black spot behind subalarum, the metapleura except areae coxales; pronotal base and ridge, and in Florida specimens large dorsal mark on coxae III light lemon yellow; flagellum with white annulus; on the average somewhat larger than alternative subspecies. (Length 14-16 mm).

..... *volens volens* (Cresson)

- Black marks on head and thorax tend to be considerably more extensive than in alternative subspecies; particularly on head, mesoscutum, mesopleura, metapleura, and petiole; antennal cavity, middle of frons, and ocellar region almost always black, often also occipital region; pleura and mesoscutum more or less extensively to entirely black; pronotal base and ridge more restrictedly, the coxae II as a rule not at all or less distinctly yellow marked; flagellum sometimes without white annulus; on the average somewhat smaller than alternative subspecies. (Length 13-15 mm).
- *volens borealis*, new subspecies

FEMALE: (*Cratichneumon howdeni* Heinrich from North Carolina). Length 13 mm. Light orange ferruginous, with very restricted black markings and with yellow scutellum; black are only: median furrow of mesosternum, median area of prepectus, and basal band on 3rd tergite; sometimes also extreme base of 2nd and 4th tergite infuscated; apices of tibiae III and the tarsi III blackish infuscated; flagellum ferruginous, with almost complete white annulus on segments 7 (apex) or 8 to 15, section before annulus dorsally brown, section beyond annulus black; scape ferruginous.

FLAGELLUM: Subfiliform, slightly attenuated toward apex, somewhat widened and ventrally flattened beyond middle, with 37 segments (holotype *howdeni*), the 1st about 1.5 times as long as apically wide, in lateral view about the 7th square, the widest on the flat side about 1.5 times as wide as long.

HEAD: Temple profile not narrowed behind eyes, moderately curved; cheeks in lateral view moderately wide, flat, not tangibly convex in transverse or longitudinal direction, cheek profile in frontal view therefore practically straight and only slightly narrowed toward mandibles; outline of head in frontal view nearly square; malar space markedly longer than width of mandible base; carina genalis gradually somewhat

diverging from posterior margin of eyes toward mandible base; malar space without distinct longitudinal impression separating cheeks from face; median field of face distinctly protruding; face moderately densely and coarsely rugose punctate, clypeus with scattered coarse punctures, cheeks impunctate, polished; frons with coarse, longitudinal wrinkles; mandibles robust, lower tooth very small, upper tooth stout and blunt.

THORAX: Mesoscutum somewhat longer than medially wide, moderately convex, coarsely and densely punctured, shiny between punctures; notauli basally indicated; scutellum only slightly convex, polished, with a few scattered punctures; propodeum very coarsely, irregularly rugose punctate, with complete carination; area superomedia hexagonal, longer than wide, with costulae about in the middle, strongly narrowed from costulae toward area basalis; apices of areae dentiparae somewhat protruding; area posteromedia strongly concave; metapleura and the mesopleura (except very finely punctate speculum) extremely coarsely, irregularly reticulate rugose.

LEGS: Comparatively slender, the femora III in lateral view more than 3 times as long as wide; coxae III with distinct scopa, ventrally shiny, with sparse puncturation.

WINGS: As in male; nervulus slightly postfurcal.

ABDOMEN: Postpetiole (in contrast to male) distinctly and rather densely longitudinally rugose, with faintly indicated median field; tergites 2 and 3 very finely and extremely densely punctured and coriaceous, completely opaque; the following tergites extremely finely sculptured, subopaque, ovipositor somewhat projecting.

MALE: (Florida population, Table 8). Length 14-16 mm. Light orange ferruginous, with restricted black and pale lemon-yellow markings as detailed below.

FLAGELLUM: With 38-41 segments and with narrowly-oval, short tyloids on segments 6 or 7 to 19 or 20, the last 3-4 very small and short, bacilliform. Ferruginous, dorsally infuscated, except on basal section, with yellowish-white dorsal annulus on segments 12 or 13 or 14 or 15 to 17 or 19 or 20 (in 1 specimen somewhat indistinct); scape light ferruginous.

HEAD: Temple profile in vertical view not narrowed behind eyes, rather strongly curved; cheek profile in frontal view moderately narrowed toward mandible base, with

straight outline; malar space slightly more than 1/2 as long as width of mandible base; mandibles and clypeus normal; median field of face slightly protruding; frons a trifle concave, with fairly coarse, longitudinal wrinkles. Light orange ferruginous, without black marks; pale lemon yellow are: entire face and clypeus, outer orbits broadly (the yellow gradually shading into ferruginous toward posterior border of cheeks), mandible base, and narrowly the lower part of frontal orbits.

THORAX: Mesoscutum moderately convex, coarsely and densely punctured; about basal 1/4 of notauli distinct; scutellum convex, shiny, with some fine, sparse punctures; sternauli indicated; propodeum coarsely rugose punctate, with complete carination, except anterior bordering carina of area superomedia often obsolete; basal furrow distinct; areae dentiparae markedly slanting backward, apically not projecting; area posteromedia transversely rugose. Light orange ferruginous; the following black: prosternum (except narrowly ferruginous apex), entire prepectus, mesosternum to sternauli, inferior 1/3 of propleura along pronotal base, patch on mesopleura in front of coxae II, mark below subalarum, areae coxales, usually anterior end of median lobe of mesoscutum restrictedly, lateral slopes of scutella, and basal furrow of propodeum; the following pale lemon yellow: collare, pronotal ridge and base, subalarum, tegulae, scutellum, postscutellum, declivity of propodeum except area posteromedia and including about apical 1/2 of areae spiracularae, sometimes marks on prescutellar carinae.

LEGS: Ferruginous, apex of tibiae III and the tarsi III blackish infuscated; tibiae and tarsi I and II dorsally yellow tinged, as is usually also a dorsal mark on tibiae III beyond base; the following are lemon yellow: coxae and trochanters I and II and a large dorsal mark on coxae III.

WINGS: Nervulus interstitial; areolet pentagonal, but intercubiti rather strongly narrowed in front; radius nearly straight.

ABDOMEN: Median field of postpetiole faintly indicated, shiny and nearly smooth, with finely coriaceous subsculpture, the lateral fields with some puncturation; tergites 2-4 distinctly and very densely punctured, with very fine, coriaceous under-sculpture, opaque; the following tergites extremely fine punctured and coriaceous, subopaque; gastrocoeli indicated by some irregular longitudinal rugae, thyridia dis-

tinged, narrow; hypopygium triangularly pointed. Light orange ferruginous, postpetiole usually apically yellow; petiole not black except ventrally; tergites 2-5 with basal black bands, which do not reach to the lateral borders of tergites and decrease from tergite to tergite gradually in longitudinal extent, reaching on 2nd tergite usually to slightly beyond thyridia.

DISTRIBUTION (map 85): Virginia south to central Florida. **FLORIDA.** Highlands Co.: 1 male, Archbold Biological Station, V-7-VI-1967, G. Heinrich; 4 males, Highlands Hammock State Park, 4-V-14-VIII-1969-1970, G. Heinrich. Pinellas Co.: 1 male, Tarpon Springs, 12-XII-1949, H. Townes. All specimens in CGH II.

HOSTS: According to Townes and Townes (1951) (= *Faronta diffusa* (Walk.) Noctuidae).

ECOLOGY: The northern subspecies inhabits grassy, overgrown fields.

28b. *Cratichneumon volens borealis*, new subspecies

MALE (Table 8): Length 13-15 mm. Differs from the nominate form by the, on the average, considerably more extensive black markings on head and thorax; in contrast to nominate form antennal cavity, middle of frons, and ocellar region almost always black, often also occipital region partially or



Map 85. *Cratichneumon volens volens* (Cresson)

predominantly; black are, in addition to black parts as in nominate form: lower 1/2 or almost all of propleura, mesopleura all around to entirely, mesoscutum on anterior part of median lobe and exterior sides of lateral lobes to entirely, anterior part of metapleura to their entire surface, usually base of horizontal part of propodeum, often including areae superomedia and supero-externae, lower end or all of area postero-media, and petiole basally to entirely; flagellum usually with, sometimes without annulus; basic color less bright than in nominate form; otherwise as *volens volens*.

FLAGELLUM: With 39-41 segments and with tyloids as in *volens volens* on segments 7 or 8 to 18 or 20. Ferruginous, dorsally infuscated, usually with yellowish-white annulus on segments 12 or 13 or 14 to 20 or 21 or 22, sometimes, particularly in the southern section of the range, without annulus; scape ferruginous.

HEAD, THORAX, LEGS, WINGS, and ABDOMEN: Structure and sculpture as in *volens volens*. Black markings as described above; yellow markings generally as in *volens volens*, but on the average somewhat less extensive: yellow on outer orbits rarely, on pronotal base and on dorsal side of coxae III usually lacking or reduced, on pronotal ridge and propodeum sometimes reduced.

FEMALE: Length 12 mm. A female from the type locality of this subspecies (Maine) has not been found. The specimen chosen as allotype comes from Michigan; it displays melanistic pattern exactly analogous to the type of males from Maine, and I therefore suppose its subspecific association with the latter, although the only male from Michigan (Ann Arbor) known to me (CHT) is chromatically closer to the nominate form than to subspecies *borealis*.

Differs from *volens volens* 1st by the lack of flagellar annulus and 2nd by considerably more extensive black markings on head and thorax; black are: about lower 1/2 of propleura, almost entire prosternum, entire prepectus, entire mesosternum to sternauli, patch on mesopleura before coxae II, areae coxales, apical section of area posteromedia, and base of petiole; scutellum ferruginous, as is the rest of thorax; tip of tibiae III and the tarsi III somewhat infuscated; antenna ferruginous, flagellum slightly infuscated dorsally, without annulus; lower section of cheeks slightly convex in both directions.

FLAGELLUM: Subfiliform, slightly attenuated toward apex, somewhat widened and ventrally flattened beyond middle, with 32

TABLE 8. Distribution of black on head, thorax, and petiole of 22 males of *Cratichneumon volens borealis* from Maine and 4 males of *Cratichneumon volens volens* from Florida.

No. specimens Maine: Florida		Distribution of black
22:3	Head:	antennal cavity
22:2		middle of frons
22:1		ocellar region
20:0		occipital region more or less extensively
22:4	Prosternum:	entirely or except apical margin
1:4	Mesosternum:	from middle to sternauli only
21:0		entirely
22:4	Prepectus:	entirely
0:4	Propleura:	less than lower 1/2
4:0		more than lower 1/2
18:0		entirely except only pronotal ridge and base
0:4	Mesopleura:	only mark before coxae II and mark below subalarum
4:0		also anterior section and about upper 1/3
11:0		predominantly except median ferruginous mark
7:0		entirely
0:4	Metapleura:	areae coxales only
6:0		also parts of areae metapleurales
16:0		entirely
0:4	Mesoscutum:	only narrow anterior part of median lobe
13:0		more extensively but not predominantly
9:0		predominantly or entirely
11:0	Propodeum:	base of horizontal part more or less extensively but not including area superomedia
11:0		base of horizontal part including area superomedia
22:0		area posteromedia apically to entirely
22:0	Petiole:	basally or entirely on dorsal side

segments, the 1st about 1.3 times as long as apically wide, in lateral view about the 6th square, the widest, on the flat side, nearly 1.5 times as wide as long.

HEAD: Structure and sculpture generally as in *volens volens*, the cheeks in lateral view, however, slightly convex in transverse and longitudinal directions, the cheek profile therefore in frontal view a trifle curved toward mandibles; cheeks with a few widely scattered punctures.

THORAX: Structure and sculpture generally as in *volens volens*, but mesoscutum slightly shorter as compared with its median width and slightly less convex; the area superomedia longer than wide but not hexagonal, with costulae far behind middle, not converging from costulae toward area basalis, the latter rudimentary in allotype; sculpture of mesopleura and metapleura not so extremely coarse.

LEGS, WINGS, and ABDOMEN: As described for *volens volens*, gastrocoeli blackish; the 3rd tergite with narrow basal and apical black band; base of petiole dorsally black.

Holotype: male, Maine, Livermore Falls, 25-VII-1956. Allotype: female, Michigan, South Haven, 5-VI-1940 (CHT). Paratypes: All from Maine: 2 males, same data as holotype. 4 males, Dryden, 6 and 17-X-1953, 21-VIII-1955. 2 males, Hinckley, 3-V-1953. Mt. Blue, Weld, 1 male, 30-VI-1955, 12 males, 30-V-11-VI-1960, 2 males, 11 and 19-VI-1965. All specimens in CGH II unless noted otherwise.

DISTRIBUTION: Maryland north to Maine and Michigan.

29a. *Cratichneumon annulatipes annulatipes* (Provancher)

Phaeogenes annulatipes Provancher, 1886: 43, female.

Cratichneumon annulatipes Townes and Townes, 1951:287, female.

Cratichneumon annulatipes annulatipes, Heinrich, 1961:145-146, female, male.

Holotype: female, Ontario; CNC (No. 48). Neallotype: male Quebec; CGH II.

SYSTEMATICS: A small, polychromatic species, of so considerable individual and geographical variability, that a general color description covering the entire conspecies does not seem feasible.

Females are distinguished by the combination of the following characters: (1) flagellum exactly filiform, slightly tapering toward the base; (2) coxae III shiny, densely punctured, without scopa; (3) 2nd tergite distinctly and

densely, though finely punctured; (4) scutellum always yellow; (5) horizontal part of propodeum barely shorter than declivity, finely sculptured, weakly carinate, the area superomedia longer than wide, narrowed toward area basalis, and usually finely and regularly transversely striate; costulae obsolete; (6) all tibiae with ivory mark on dorsal side beyond base, indistinct sometimes on tibiae III.

Males are characterized particularly by a long row of tyloids beginning on the 2nd or 3rd flagellar segment; femora III rather stout.

The species has been divided by Heinrich (1961) into 3 geographical subspecies which show startling differences in color pattern, but all are linked by intergrades. Their specific association has therefore been maintained here. For further information about variability see Heinrich (1961:146).

FEMALE: Length 5-9 mm. Thorax black, scutellum yellow; the following ferruginous: propodeum more or less extensively, collare, pronotal ridge, subalarum, tegulae; femora III black; coxae III black, usually ferruginous marked on dorsal side; tibiae III with more or less distinct ivory mark beyond base, apically broadly black, basally usually only slightly or indistinctly infuscated, exceptionally blackish.

MALE: Length 9-13 mm. Thorax, including pleura and propodeum black, propodeum and mesopleura varying to partially ferruginous, the propodeum sometimes to entirely ferruginous; abdomen dark ferruginous, with or without basal black bands or marks on tergites 1-5 or 6; femora III and coxae III black, the coxae III varying to partially or predominantly ferruginous; tibiae III ivory, apically infuscated, basally not or indistinctly infuscated, tarsi III pale orange or ivory; scutellum and pronotal ridge ivory, mesoscutum without median mark.

DISTRIBUTION: Quebec, Ontario, Michigan, Maine, Massachusetts.

29b. *Cratichneumon annulatipes quintilis* (Viereck)

Amblyteles quintilis Viereck, 1917:354, 357, male.

Cratichneumon quintilis, Townes and Townes, 1951:289, partim (male).

Cratichneumon annulatipes Heinrich, 1959b:214, male.

Cratichneumon annulatipes quintilis, Heinrich, 1961:146-147, male.

Holotype: male, Connecticut; Connecticut Agricultural Experimental Station, New Haven. Neallotype: female, Lake Mohonk, New Paltz, New York; CGH II (present designation).

SYSTEMATICS: Males and females of *C. a. quintilis* differ from the nominate form by increased extent and lighter shade of red color.

FEMALE: Coxae III and femora III almost entirely orange ferruginous, the latter often narrowly black apically; horizontal part of propodeum and declivity entirely orange ferruginous, mesopleura extensively ferruginous; sterna, propleura, and metapleura, antennal cavities, broad middle of frons, ocellar and occipital regions, black; mesoscutum partially ferruginous.

MALE: Coxae III and femora III predominantly to entirely orange ferruginous; metapleura ferruginous and black in variable proportions; mesosternum and mesopleura predominantly ferruginous, often variegated with ivory markings; prescutellar carinae and short, longitudinal bands in front of them, near tegulae, ivory.

DISTRIBUTION: Connecticut and New York.

29c. *Cratichneumon annulatipes* *facetops* Heinrich

Map 86

Cratichneumon annulatipes facetops Heinrich, 1961:147, male.

Holotype: male, Missouri; CGH II. Neallotype: female, Natchez Trail State Park, Henderson Co., Tennessee; CGH II (present designation).

SYSTEMATICS: The black color, predominant in the nominate form, almost disappears in both sexes of this subspecies, being replaced by orange and ivory. Characteristic for the males are, in addition, the ivory prescutellar carinae and short, longitudinal, ivory bands in front of prescutellar carinae near tegulae on sides of mesoscutum.

The chromatic difference of *a. facetops* from *a. annulatipes* is considerable, constant, and striking, suggesting specific distinction of the 2 forms; the existence of the chromatically and geographically intermediate, preceding form, *a. quintilis* (Viereck), however, contradicts such hypothesis.

FEMALE: Length 6 mm. Nearly entirely orange ferruginous, with very restricted ivory, as well as black markings; the following ivory: mark on collare, the scutel-

lum, postscutellum, pronotal ridge narrowly and indistinctly, subalarum narrowly, and an indistinct mark on dorsal side of tibiae I and II beyond base; tibiae III pale orange, apically infuscated, with faint indication of an ivory-tinged mark dorsally beyond base; the following black: antennal cavities, ocellar region, lower part of occipital region along carina occipitalis, base of prosternum, prepectus, propleura more or less extensively, small mark on mesopleura in front of coxae II, small mark below subalarum, basal furrow of scutellum, axillary troughs, sometimes basal furrow of propodeum, always areae coxales; flagellum black, with complete white annulus on segments 7 to 11 or 12; basal segments brownish tinged on ventral side and apically. Scape orange, infuscated on exterior side.

FLAGELLUM: Filiform, apically blunt, slightly narrowed toward base, with 22-24 segments, the 1st not quite twice as long as apically wide, in lateral view the 5th square, the widest on the flat side barely wider than long.

HEAD: Temple profile slightly narrowed behind eyes, curved; cheek profile moderately narrowed toward mandible base; malar space fully as long as width of mandible base; cheeks in lateral view wide, convex, moderately sparsely, finely punctured, glossy between punctures; median field of face distinctly, lateral fields of face slightly, protruding.

THORAX: Transverse rugosity of area superomedia not recognizable; mesoscutum about as long as wide, rather flat, fairly densely punctured, shiny between punctures; notauli indicated at the extreme base only.

LEGS: Stout; coxae III ventrally densely punctured, without trace of scopa.

ABDOMEN: Postpetiole very finely coriaceous rugose; 2nd tergite distinctly and densely, though finely, punctured, coriaceous between punctures; 3rd tergite still finer punctured to about middle.

MALE: Length 9-10 mm. Head white, the following black: antennal cavities, usually the middle of frons, always ocellar and occipital regions; mesoscutum red; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae, scutellum, postscutellum, prescutellar carinae, a short longitudinal band on each side of mesoscutum between prescutellar carina and tegula, 2 short, more or less distinct, median stripes on mesoscutum, almost entire mesopleura, and exterior belt of prepectus broadly

all around; propodeum entirely ivory or ivory-tinged orange; the following black: propleura, prepectus except exterior ivory belt, a small band below subalarum, exterior sutures all around mesoscutum, basal furrow of scutellum, axillary troughs, basal furrow of propodeum narrowly, and sometimes areae coxales; legs orange, the following ivory: coxae I and II, ventral side of coxae III, all trochanters, all tarsi, tibiae I and II dorsally, and tibiae III except about apical 1/3, blackish or brownish infuscated; abdomen orange, tergites 1 and 2 apically usually ivory; flagellum black, ventrally pale ochreous, with complete white annulus on segments 12 or 13 or 14 to 19 or 20 or 21; scape ventrally ivory.

FLAGELLUM: With 32 segments and with bacilliform tyloids on segments 2 or 3 to 12 or 13, the longest not reaching to bases and apices of segments.

HEAD: Temple profile slightly narrowed behind eyes, curved; malar space about 1/3 as long as width of mandible base; median field of face slightly protruding toward upper end.

DISTRIBUTION (map 86): Indiana, Washington, D.C., Virginia, Missouri, and Tennessee. MISSOURI. Ralls Co.: 3 males, Hannibal, 15-IX-1952, G. Heinrich. TENNESSEE. Henderson Co.: 1 female, 1 male, Natchez Trail State Park, 16-21-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.



Map 86. *Cratichneumon annulatus facetops* Heinrich

22. Genus *Homotherus* Foerster

Homotherus Foerster, 1868:185. Perkins, 1959:1960:153. Heinrich, 1961:173.

Type species: *Ichneumon locutor* Thunberg.

SYSTEMATICS: This genus is most closely related to *Cratichneumon* Thomson. The only differentiating characters are the gastrocoeli and thyridia, which are markedly wider than long in *Homotherus*, their interspace being much narrower than 1 of them. In this regard the genus approaches *Aoplus* Tischbein, linking the latter genus with *Cratichneumon*. It is in many cases, particularly in males, not easy to distinguish the 2 genera. The following are the differences:

Homotherus

1. Mesoscutum as a rule shiny, without dense coriaceous undersculpture between punctures.
2. Thyridia approximately parallel to anterior border of second tergite.
3. Thyridia usually rather poorly defined, often fading toward center of tergite, sometimes altogether fairly indistinct.
4. Females do not hibernate.

Aoplus

1. Mesoscutum as a rule opaque, with dense undersculpture between punctures.
2. Thyridia oblique, forming a considerable angle with anterior border of 2nd tergite.
3. Thyridia always clearly defined, well impressed and not fading medially.
4. Females hibernate.

I consider the last, the biological difference, as particularly important and decisive for the separation of the 2 genera as well as for the generic placement of a particular species with perhaps doubtful characters.

MORPHOLOGICAL CHARACTERS

Generally, except for the differences in gastrocoeli and thyridia, the same as in *Cratichneumon*.

FLAGELLUM: Of female fairly short, and as a rule filiform, only in the North American species *semiaoplus* Heinrich (which stands on the borderline between *Aoplus* and *Homotherus*) apically distinctly attenuated; of males with row of approximately bacilliform tyloids and toward apex slightly nodose.

HEAD: Temple profile usually scarcely (only in *semiaoplus* more distinctly) nar-

rowed behind eyes, slightly curved; cheek profile usually distinctly narrowed toward mandible base, nearly straight; malar space approximately as long as mandible base or slightly shorter in females, strongly abbreviated in males; frons below lower ocellus in males of *townesi* Heinrich with a very slight vertical furrow (this character has been attributed by mistake in the key, Heinrich, 1961:106, to *semiaoplus*); median field of face distinctly protruding.

THORAX: Mesoscutum rather short, little longer than wide, slightly convex; anterior (about) 1/4 of notauli distinct in females, still more pronounced in males; sternauli weakly indicated; scutellum flat in females, somewhat raised and convex in males; propodeum short, the area posteromedia considerably longer than the horizontal part medially; carination distinct and complete, area basalis confluent with basal furrow of propodeum; costulae and lateral carinae of area posteromedia often indistinct in females; area superomedia as long as wide, in males usually slightly wider than long, with costulae before middle, narrowed from costulae toward area basalis, about hexagonal; mesoscutum shiny, sparsely to moderately densely punctured.

LEGS: Femora rather stout; coxae III of females without scopa.

WINGS: Nervulus slightly to distinctly postfurcal; areolet pentagonal, strongly narrowed in front; radius short, almost straight.

ABDOMEN: Of female oxygygous, the ovipositor distinctly projecting; postpetiole with weakly indicated median field, irregularly finely rugose or coriaceous, the 2nd tergite coriaceous or finely punctured; in males postpetiole usually less densely sculptured than in females and more shiny; thyridia transverse, their interspace narrower than 1 of them, in females sometimes fairly indistinct and difficult to find, in males usually distinct.

CHROMATIC CHARACTERS: Basic color rufous or red brown, with black parts and restricted white marks on head and thorax; abdomen usually without black and always without white marks. Sexual dichromatism inconspicuous.

DISTRIBUTION: Holarctic Region.

Homotherus townesi Heinrich

Fig. 39, Map 87

Homotherus townesi Heinrich, 1961:175-176, female, male.

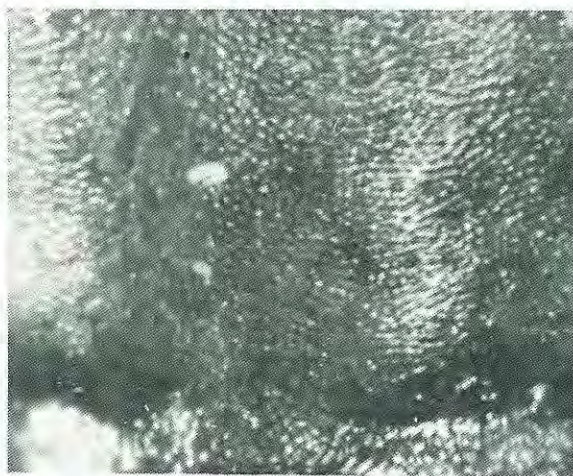


Fig. 39. *Homotherus townesi* Heinrich (female). Second tergite, dorsal view.

Holotype: female, Maine; CGH II. Allotype: male, Maine; CGH II.

SYSTEMATICS: The male of this species can be recognized by a shallow and narrow vertical median furrow on the frons between the lower ocellus and the antennal cavity, the female by the finely-alutaceous sculpture of the 2nd tergite without distinct punctation (fig. 39).

FEMALE: (northern populations). Length 7-8 mm. Head and thorax red brown, extensively variegated with black, frontal and vertical orbits sometimes narrowly yellowish; coxae III, femora III, and apex of tibiae III black; abdomen uniformly red brown, except basally more or less extensively black petiole; flagellum with complete white annulus on segments 8 or 9 to 12; scape ventrally ferruginous.

FLAGELLUM: Short, filiform, fairly slender, not widened beyond middle, with 23-25 segments, the 1st not quite twice as long as apically wide, in lateral view the 6th square.

HEAD: Malar space as long as width of mandible base. Red brown, the following black: antennal cavity, middle of frons broadly, ocellar, occipital, and temple regions, the black on temples often expanding to the margin of eyes; sometimes also black on frons and vertex more or less extensively replaced by red brown; sometimes frontal orbits and marks on vertical orbits narrowly yellowish.

THORAX: Area posteromedia about 1.4 times as long as horizontal part of propodeum medially; lateral carinae of area posteromedia obsolete, costulae more or less distinct. Red brown, the following black: prosternum, prepectus, mesosternum, pro-

pleura, longitudinal band below subalarum, mesopleura in front of coxae II, areae coxales, sutures around mesoscutum, sometimes lateral lobes and anterior part of mesoscutum, basal furrow of scutellum, lateral slopes of scutella, and basal sutures of propodeum.

LEGS: Red brown, the following black: coxae II partially, coxae III predominantly (usually except ventral side and base or dorsal side), entire femora III, apex of tibiae III, 1st trochanters III except apically, sometimes also 1st trochanters I and II more or less extensively; rest of trochanters whitish; sometimes also femora I and II extensively infuscated.

ABDOMEN: Postpetiole distinctly and densely irregularly rugose; 2nd tergite finely alutaceous, without distinct punctures, the following tergites smooth; thyridia transverse, but very superficial and sometimes hardly recognizable.

MALE: (the Florida male agrees with northern males in color): Length 8-9 mm. Face, clypeus, cheeks, and most of orbits lemon yellow, as are also: apex of prosternum, collare, pronotal ridge and base, subalarum, tegulae, scutellum, postscutellum, large marks on declivity of propodeum, all trochanters, coxae I and II, coxae III apically on ventral side, tibiae and tarsi I and II, tibiae III basally, ventral side of femora I and II extensively; femora III black, red on ventral side and on base; tarsi III orange-tinged yellow; flagellum black, with complete white annulus on segments 13 or 14 to 17 or 18, ventrally brownish, scape ventrally lemon yellow.

FLAGELLUM: With 28-31 segments and with bacilliform, long and very narrow tyloids on segments 4 or 5 to 12, the longest, on segments 7-10, reaching close to bases but not quite to apices of segments.

HEAD: Malar space strongly abbreviated, scarcely 1/3 as long as width of mandible base; as in female, median field of face distinctly protruding and clypeus slightly convex; face and clypeus finely and moderately densely punctured, shiny; frons with vertical median furrow below lower ocellus, sparsely punctured. Yellow band around eyes strongly narrowed at vertex, widened again behind ocellar triangle and broadly interrupted on temples.

THORAX: Notauli more pronounced than in female, scutellum more raised, propodeum more abbreviated, the area superomedia slightly wider than long. Yellowish-white marks on propodeum occupy the areae

posteroexternae and about apical 1/2 of areae dentiparae and spiraculiferae; areae superoexternae and about upper 1/3 of mesopleura black; distribution of black and red brown otherwise as described for the female; mesoscutum bright red brown except black sutures around it.

ABDOMEN: Transverse thyridia somewhat removed from base of 2nd tergite and rather distinct; tergites 2-4 distinctly, though finely, punctured. Median field of postpetiole apically faintly yellow tinged.

DISTRIBUTION (map 87): Quebec, Ontario, Michigan, and Maine south to Florida. FLORIDA: Highlands Co.: 1 male, Archbold Biological Station, 10-II-1968, G. Heinrich (CGH II).

23. Genus *Barichneumon* Thomson

Barichneumon Thomson, 1893:1959. Perkins, 1959-1960:153. Townes, et al., 1965: 483, 595.

Type species: *Ichneumon anator* Fabricius; designated by Ashmead, 1900.

Melanichneumon subgenus *Barichneumon* Heinrich, 1962:620.

SYSTEMATICS: As Perkins (1959-1960) has already stated, this genus has, in the vague definition applied so far, comprised a multitude of morphologically as well as biologically completely heterogenous elements. It has been my endeavor for decades to recognize the different natural groups involved and to define their characters in



Map 87. *Homotherus townesi* Heinrich

order to improve the unsatisfactory taxonomic situation. The introduction of the genera *Stenobarichneumon* and *Vulgichneumon* were steps in this direction, the introduction of the genus *Virgichneumon* is a further step. As far as our present (most likely rather incomplete) knowledge of the Nearctic fauna is concerned, the elimination of these 3 genera will establish the remaining genus, *Barichneumon* Thomson sensu stricto, as represented by its type species (the Holarctic *anator* Fabricius), as a rather clear-cut taxonomic unit. This does not, however, apply to the Palearctic fauna which still comprises a few additional generic elements.

Townes, et al. (1965) has synonymized with *Barichneumon* 4 oriental genera described by Cameron: *Gurfyia*, *Harsaces*, *Darpasus*, and *Stictichneumon*. These may well be synonyms of the unrevised and confound genus *Barichneumon* of the past, but I am not sure that they all are synonyms of *Barichneumon* sensu stricto as interpreted in this paper and as represented by the type species. As I cannot make a comprehensive study of the oriental section of the *Barichneumon* complex at the present time, the taxonomic position of the 4 synonymized genera must remain undiscussed.

MORPHOLOGICAL CHARACTERS: The overwhelming majority of the *Barichneumon* species are small insects, 6-10 mm long. Females are distinguished by a short, convex abdomen with fairly strongly sclerotized and neatly punctured tergites, by short and stout, usually filiform antennae, and by short and stout femora. The structure of the gastrocoeli is most decisive: they are very small, often punctiform or obsolete (in strong contrast to *Virgichneumon*), with small, often indistinct thyridia which are in males usually more distinct than in females, but (in contrast to *Vulgichneumon*) not markedly removed from the base of 2nd tergite.

The following are the most distinctive characters of the genus: (1) Structure of gastrocoeli and thyridia as described above. (2) Flagellum of female with short basal segments, the 1st usually less than twice as long as apically wide; short and usually filiform, exceptionally slightly attenuated at apex. (3) Basal part of nervus basalis tends to curve slightly toward base of wing, thus rendering the lower interior angle of the discocubital cell, a right angle. (4) Spiracles of propodeum small, usually short and not longer than 4 times as long as medially wide. (5) Postpetiole always punctured, never

median field striate or rugose. (6) Femora of females stout, their coxae III without distinct scopa. Structure otherwise as in *Vulgichneumon* and *Virgichneumon*.

CHROMATIC CHARACTERS: The Holarctic type species, *anator*, is the only one known to me with black abdomen and white apical marks in females. The Nearctic species are all predominantly ferruginous red in females, most of them without distinct apical white marks. Sexual dichromatism is considerable, males being often distinguished by white and black markings and bandings completely lacking in females.

DISTRIBUTION: Holarctic Region. The genus is represented in the Nearctic Region by a considerable number of forms, in the southeastern states by the greatest species number (9) next to *Cratichneumon* (29).

HOST: Very little is known about the hosts of this group. The type species was reared, according to Perkins (1959-1960:154), from *Pyralis farinalis* Linnaeus.

Key to southeastern species of *Barichneumon* Thomson

FEMALES

1. Flagellum perfectly bristle shaped, long and slender, with 1st segment more than 3 times as long as apically wide. (Propodeum abbreviated; orbits broadly white almost all around; 7th tergite with white mark; length 7-11 mm).
..... see *Virgichneumon seticornutus* Heinrich
- Flagellum stout, short or fairly short, filiform to bristle shaped, with the 1st segment never more, usually less than 3 times as long as apically wide. (Abdomen predominantly orange or ferruginous). 2
2. Scutellum clearly and entirely white. (7th tergite usually with apical white mark, coxae III dorsally white marked). 3
- Scutellum ferruginous (as is the mesoscutum), at the most whitish tinged at sides and apex. 4
3. Tarsi III predominantly, tibiae III apically, often also tip of femora III, blackish infuscated; length 6-8 mm. (Basic color of body light orange ferruginous; pronotum not marked with black).
..... 1. *flaviscuta* Heinrich
- Tarsi III and apices of tibiae III and of femora III not blackish infuscated; length 10 mm. (Basic color of body dark ferruginous red; median part of pro-

- notum in type specimen black)
..... 5. *archboldi* Heinrich
4. 7th tergite with apical white mark. (Orbits without ivory marks; temple profile and cheek profile markedly narrowed behind eyes and toward mandibles respectively; femora III rather stout; length 5-7 mm).
2b. *sphageti crassipunctatus* Heinrich
- 7th tergite without apical white mark. 5
5. Orbits usually extensively white, at least the vertical orbits white marked. 6
- Orbits without distinct white or yellow markings. 11
6. Orbits clearly white all around eyes, except only on malar space. (Apices of femora III and of tibiae III never infuscated; scutellum laterally faintly carinate close to middle; flagellum filiform, not widened beyond middle, only the last segment tapering to apex; length 7-8 mm)
..... 4. *neosorex* Heinrich
- Only vertical, sometimes also frontal orbits white marked, never exterior orbits. 7
7. Vertical orbits together with frontal orbits white, downward, at least to level with antennal sockets. (Flagellum exactly filiform; temple profile only slightly narrowed behind eyes, with curved outline; gastrocoeli subobsolete; apices of femora III and of tibiae III usually slightly infuscated; length 5-7 mm)
..... 3. *libens* (Cresson)
- White on orbits more restricted. 8
8. Temple profile barely narrowed behind eyes; areae dentiparae abbreviated, the carina dentipara exterior shorter than the exterior carina of area superoexterna; flagellum short, stout, filiform. (Scutellum apically truncate, at base distinctly wider than medially long; length 5-6 mm).
..... 8. *carolinensis* Heinrich
- Temple profile markedly narrowed behind eyes, with nearly straight outline; areae dentiparae not abbreviated; flagellum filiform to subbristle shaped, not particularly short and stout. ... 9
9. Areae dentiparae drawn out into long, narrow ends, slanting downward toward coxae III; scutellum not depressed and laterally not carinate; flagellum filiform. (Vertical orbits, at the most, with a short and narrow whitish band; apices of femora III and of tibiae III not infuscated; length 8 mm).
..... 7. *floridanus* Heinrich
- Areae dentiparae not drawn out into narrow ends and not markedly slanting; scutellum depressed, flattened, with sharp lateral edges at least to the middle, usually beyond; flagellum subbristle shaped, distinctly tapering toward apex. (Length 7-8 mm).
..... 6. *peramoenus* Heinrich. 10
10. Apices of femora III and of tibiae III distinctly blackish infuscated.
6. a. *peramoenus peramoenus* Heinrich
- Apices of femora III and of tibiae III not infuscated.
6b. *peramoenus calliandros* Heinrich
11. Scutellum with fairly pronounced lateral carinae almost to its end. (Femora III and tibiae III apically not infuscated; end of areae dentiparae slightly, but not considerably, prolonged; length 8 mm).
..... 9. *fuscusignatus* Heinrich
- Scutellum without trace of lateral carinae. 9

MALES

1. Mesoscutum entirely or extensively ferruginous or orange. 2
- Mesoscutum black, with or without white stripes. 6
2. Flagellum with white annulus. (Prescutellar carinae never marked with white; abdomen orange, anterior tergites sometimes with ivory-tinged apical margins; only tips of tarsi III infuscated; length 9 mm).
..... 7. *floridanus* Heinrich
- Flagellum without white annulus. ... 3
3. Mesoscutum with 2 longitudinal, median, white lines and usually with 2 short, lateral white lines, partially black. (Apices of femora III and of tibiae III black; length 9-11 mm).
..... 5. *archboldi* Heinrich
- Mesoscutum uniformly orange, without longitudinal, white lines. (Length 5-8 mm). 4
4. Prescutellar carinae marked with white; femora III rather stout and thick. (Sterna, and at least 1/2, usually most of mesopleura, white; length 6-8 mm).
..... 8. *carolinensis* Heinrich
- Prescutellar carinae not white marked; femora III more slender and more elongate. 5

5. White band around orbits continuous, not interrupted on temples, but narrowly on malar space by a black mark. (Basic color of pleura, propodeum, and mesosternum orange, varying often to ivory on mesosternum and on lower part of mesopleura; length 7-9 mm).
... 1. *flaviscuta* Heinrich (tentative)
- White band around orbits broadly interrupted and replaced by black on temples. (Length 6-8 mm).
2 b. *sphageti crassipunctatus* Heinrich (tentative)
6. Flagellum with white annulus. (Mesoscutum with 4 longitudinal white stripes; length 7-10 mm).
..... 6. *peramoenus* Heinrich... 7
- Flagellum without white annulus. ... 8
7. Anterior tergites, usually 1-4, basally black, apically and laterally ivory, and orange between these 2 colors; femora III and tibiae III apically broadly black; basal segments of tarsi III ivory with black apices, the apical segments entirely blackish.
6 a. *peramoenus peramoenus* Heinrich
- Abdomen orange, without black bands; at least 1st tergite or tergites 1-2, often 1-4, sometimes even 1-5 with apical ivory bands; femora III and tibiae III apically not infuscated; tarsi III orange, partially ivory, without blackish marks.
6 b. *peramoenus calliandros* Heinrich
8. Tyloids larger than in all other American species of this genus: elongate oval, almost parallel sided, and on segments 5-11 reaching almost from bases to apices of segments (fig. 40). (Mesoscutum usually with only 2 longitudinal, median, ivory stripes, sometimes also with 2 short, lateral ivory stripes; length 7-9 mm).
..... 4. *neosorex* Heinrich
- Tyloids considerably smaller, narrower, and shorter (as in fig. 43). 9
9. Mesoscutum with at least 2 longitudinal, median, ivory lines, often also with 2 short, lateral, ivory lines. 10
- Mesoscutum without longitudinal, ivory lines, usually uniformly black, rarely with an indistinct, ivory-tinged or orange, median mark. 12
10. At least the postpetiole with a large, black mark, usually also the 2nd tergite with a black, often bipartite mark, exceptionally more tergites marked with black. (Tarsi III black, but apices of femora III and of tibiae III not infuscated; length 8 mm).
..... 9. *fuscognatus* Heinrich
- Abdomen without black marks. ... 11
11. The following (among other parts) black: malar space, prepectus extensively, apices of femora III and of tibiae III, tarsi III, and a mark on coxae III; larger species, 9-11 mm long; basic color of abdomen and legs ferruginous.
.... 5. *archboldi* Heinrich, variation
- Malar space and prepectus uniformly ivory; infuscations on apices of femora III and of tibiae III absent or indistinct; tarsi III not infuscated, coxae III without black mark; small species, 6-7 mm long; basic color of abdomen and legs light orange.
..... 3. *libens* (Cresson)
12. Propodeum strongly abbreviated, the area superomedia nearly twice as wide as long, halfmoon shaped; 7th tergite with large, apical, white mark. (Malar space ivory; femora III black beyond middle; length 9 mm).
see *Virgichneumon seticornutus* Heinrich
- Propodeum less abbreviated, area superomedia not, or less, wider than long; 7th tergite without apical white mark. 13
13. Large species, 9-11 mm long; scutellum laterally carinate to about middle; postpetiole and usually several of the following tergites with apical, ivory bands.
.... 5. *archboldi* Heinrich, Louisiana variation
- Small species, 6-9 mm long; scutellum laterally not carinate; anterior tergites without apical ivory bands. 14
14. Ivory band around eyes broadly interrupted on vertex.
2b. *sphageti crassipunctatus* Heinrich, variation (tentative)
- Ivory band around eyes continuous....
.... 1. *flaviscuta* Heinrich, variation (tentative)

1. *Barichneumon flaviscuta* Heinrich

Map 88

Barichneumon flaviscuta Heinrich, 1971: 1007-1008, female, male.

Holotype: female, Mississippi; CGH II. Allotype: male, Mississippi; CGH II.

SYSTEMATICS: One of the few south-

eastern species of this genus with females distinguished by an ivory scutellum. Females are further characterized by the combination of the following characters: (1) flagellum subfiliform, slightly tapering toward the apex and barely widened beyond middle; (2) 7th tergite with apical white mark; (3) apices of tibiae III, often also femora III apically blackish infuscated; (4) orbits partially, though usually only narrowly ivory or ivory tinged.

Since the description of this species the apparently associated males have been collected frequently along with females in different localities. These males display a high degree of variability in the extent of black, ferruginous, and ivory colors; most, however, show a ferruginous mesoscutum, and in this character disagree with the male tentatively associated with *flaviscuta* in 1971. In my key to *Barichneumon* males (1971:187-190) these males run to couplet 6 (unnamed). The originally tentatively described allotype may represent an extremely melanistic variation, or a 2nd species.

FEMALE: Length 6-8 mm. Light orange ferruginous, with very restricted black markings; the following ivory: vertical and outer orbits narrowly and more or less distinctly, collare, pronotal ridge narrowly and indistinctly (usually more distinctly on apical part), subalarum, scutellum, postscutellum, mark on 7th tergite, and coxae and trochanters I and II (usually orange tinged); sometimes (in holotype) also ivory are: dorsal mark on coxae III, 2 lateral, faint marks on declivity of propodeum; the following usually are black: base of prosternum and prepectus, mesolcus, basal furrow of scutellum, axillary troughs, basal furrow of propodeum, rarely area coxalis in part, and a small mark below subalarum; apices of tibiae III and of tarsi III blackish infuscated, sometimes also tip of femora III blackish; flagellum black, with dorsal white annulus on segments 6 or 7 to 13 or 14; scape ventrally or entirely ferruginous.

FLAGELLUM: Stout, subfiliform, a trifle attenuated toward apex, barely widened beyond middle, with 27-28 segments, the 1st less than twice as long as apically wide, the 5th in lateral view square, the widest slightly wider than long.

HEAD: Temple profile scarcely narrowed behind eyes, distinctly curved; malar space about 1/2 as long as width of mandible base.

THORAX: Scutellum laterally weakly carinate to about middle; notauli basally indicated; carination of propodeum complete; area superomedia fairly large, about as wide as long or slightly longer than wide,

pentagonal; areae dentiparae somewhat slanting, with moderately drawn-out apices.

LEGS: Femora III fairly stout.

ABDOMEN: Gastrocoeli small and superficial, thyridia recognizable; postpetiole, 2nd, and 3rd tergite coarsely and densely, the basal part of the 4th tergite finely and less densely punctured.

MALE: (The following description is based on the assumption of an unusually wide range of variability, and may well cover still another species.) Length 7-9 mm. Head white, the following black: antennal cavities, broad middle of frons, ocellar and occipital regions, and mark on malar space; the white band around orbits not interrupted on temples; mesoscutum ferruginous, varying to extensively or entirely black; basic color of pleura, propodeum, and mesosternum orange ferruginous, on the mesosternum and lower part of mesopleura varying to ivory; the following always ivory: collare, pronotal ridge and base broadly, subalarum, tegulae in part, scutellum, postscutellum, 2 marks on declivity of propodeum (covering the areae posteroexternae and their close environment), prosternum except base, and exterior belt of prepectus; the following black: propleura more or less extensively (usually predominantly), band below subalarum, base of prosternum, prepectus except exterior belt, mesolcus, areae coxales, basal furrow of scutellum, axillary troughs, basal furrow of propodeum; rarely also black are the areae superoexternae, areae superomedia and posteromedia; legs orange ferruginous, the tarsi III and apices of femora III and tibiae III blackish infuscated; usually coxae III with dorso-apical black mark; 1st trochanters III with basal black mark on dorsal side; coxae and trochanters I and II white; coxae III usually with dorsal ivory mark; abdomen orange, postpetiole usually with faint apical ivory band or apico-lateral ivory marks; flagellum black, without white annulus, ventrally brownish; scape ventrally ivory.

FLAGELLUM: Usually with 27-29, exceptionally up to 32 segments, and with narrow, longish-oval tyloids on segments 4 or 5 to 11 or 12, rarely to 13.

HEAD: Temple profile barely narrowed behind eyes, distinctly curved; malar space subobsolete, scarcely 1/3 as long as width of mandible base.

THORAX: Notauli indicated at the extremely base only; scutellum nearly flat, laterally weakly carinate nearly to the middle; carination of propodeum complete;

area superomedia usually slightly wider than long.

DISTRIBUTION (map 88): ARKANSAS. Garland Co.: 5 females, 2 males, Ouachita State Park, 8-31-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Monroe Co.: 1 female, Forsyth, 20-IV-5-V-1970, G. Heinrich. LOUISIANA. Avoyelles Co.: 4 females, 1 male, Eola, 20-IV-11-VII-1972, D. Shaneck. Webster Co.: 5 females, 8 males, Bistineau State Park, 17-IV-5-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Lafayette Co.: 2 females, Water Valley, 4-VI-6-VII-1971, M. Horan. Oktibbeha Co.: 2 females, Starkville, 8-16-VII-1970, C. Sartor. Yalobusha Co.: 7 females, 1 male, Water Valley, 20-IV-9-XI-1971, M. Horan. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 20-26-VI-1972, G. Heinrich. All specimens in CGH II.

ECOLOGY: Open grassy areas with sparse growth of bushes and small trees.

2a. *Barichneumon sphageti* *sphageti* Heinrich

Barichneumon sphageti Heinrich, 1971:1008-1009, female. Heinrich, 1972:185 (key), 194-195, female.

Melanichneumon (Barichneumon) libens Heinrich, 1962:626-627 (female).

Holotype: female, Maine; CGH II.

SYSTEMATICS: Females of this species share with the preceding the ivory mark on

the 7th tergite (in northern specimens also the 6th tergite bears a small ivory mark), but they differ by ferruginous instead of ivory scutellum; they also differ from *flaviscuta* Heinrich by more slender flagellum, stouter femora III, darker ferruginous basic color of the entire body, lack of ivory on orbits, and by more narrowed behind eyes temple profile.

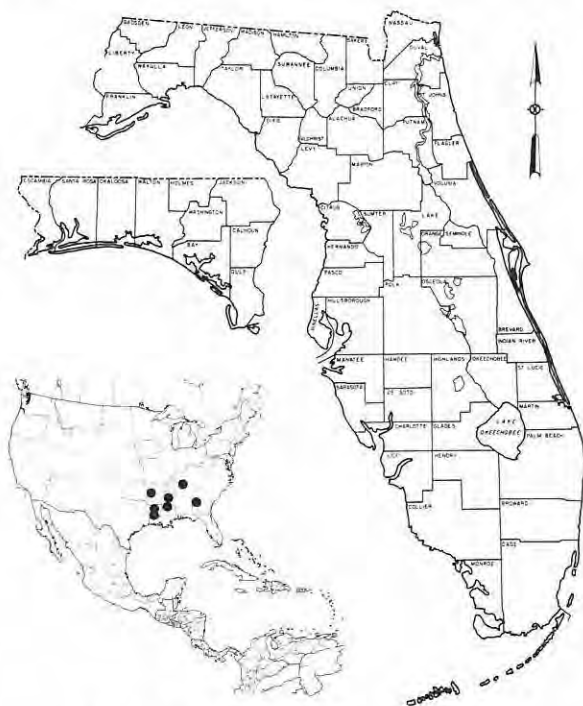
The species *crassipunctatus* Heinrich from Georgia was originally based on a female without apical ivory mark on 7th tergite; broad series of *crassipunctatus* gathered since in the southeastern states revealed that this species is distinguished by an ivory mark on the 7th tergite, which apparently in the holotype was changed to orange by a chemical influence; *crassipunctatus* is now considered as the southeastern subspecies of *sphageti*.

I suspect that a male collected in Maine, as well as in the southeastern states in several localities together with *sphageti* females may perhaps be associated with them; these males have the ivory band around orbits broadly interrupted on temples and replaced by black; black are also the antennal cavities, middle of frons, ocellar and occipital regions, and the mesoscutum. This association, not supported by any other evidence, is at present only a vague hypothesis which does not justify a detailed description.

Barichneumon sphageti is deceptively similar in appearance to *Rubicundiella perturbatrix* Heinrich; the character best distinguishing *sphageti* from that species is the densely and regularly punctured post-petiole, without indication of a median field.

FEMALE: Length 5-7 mm. Ferruginous, with restricted black and ivory markings. Basic color of tergites 6 and 7 blackish infuscated, both tergites with apical ivory marks, that on the 6th tergite smaller than that on the 7th, 1/2-moon shaped; the following black: antennal cavities, base of prosternum and of prepectus, basal furrow of scutellum, axillary troughs, basal furrow of propodeum, lower margin or all of area coxalis, apices of femora III and of tibiae III, and the tarsi III; sometimes also black are: ocellar region, lower part of occipital region, and median mark on pronotum (behind collare); flagellum black, with dorsal white annulus on segments 6 or 7 to 12 or 13, the basal segments more or less distinctly brownish; scape ferruginous, dorsally infuscated.

FLAGELLUM: Slender, filiform, a trifle tapering toward apex, not widened beyond middle, with 25-28 segments, the 1st 1.5 times



Map 88. *Barichneumon flaviscuta* Heinrich

as long as apically wide, in lateral view the 5th square, none wider than long.

HEAD: Temple profile distinctly narrowed behind eyes, slightly curved cheek profile in frontal view strongly narrowed toward mandibles, nearly straight; malar space about as long as width of mandible base.

THORAX: Mesoscutum densely punctured, shiny between punctures; scutellum laterally carinate at base; area posteromedia wide, somewhat longer than horizontal part medially; area superomedia apically as wide as medially long or slightly wider, with costulae slightly before middle, narrowed from costulae toward area basalis, sometimes into a point; areae dentiparae fairly long and narrow, elongate, slanting down comparatively far toward base of coxae III, the carinae dentiparae exteriores nearly straight and parallel to carinae dentiparae interiores.

LEGS: Femora III very short, inflated, in lateral view only 3 times as long as medially wide; coxae III densely punctured, without scopae.

ABDOMEN: Postpetiole with only a faint indication of the median field, coarsely, neatly, and densely punctured all over; tergites 2 and 3 likewise punctured, the 4th tergite on basal part also densely and distinctly punctured, though slightly less coarsely.

DISTRIBUTION: Maine.

**2b. *Barichneumon sphageti*
crassipunctatus Heinrich, new status**
Map 89

Barichneumon crassipunctatus Heinrich, 1971:1009-1010, female. Heinrich, 1972:187 (key), female.

Holotype: female, Georgia; CGH II.

FEMALE: Tergites 6 and 7 not infuscated; only the 7th tergite with apical ivory mark; head, areae coxales, and pronotum always uniformly ferruginous, usually also prepectus and prosternum without black marks.

DISTRIBUTION (map 89): ARKANSAS. Garland Co.: females, Ouachita State Park, 8-29-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Clarke Co.: 1 female, Athens, 21-VIII-7-IV-1970, L. Hermann. LOUISIANA. Evangeline Co.: 1 female, Bayou Chicot, 5-12-IV-1970, G. Heinrich. Webster Co.: 3 females, Bistineau State Park, 21-IV-6-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Yalobusha Co.: 2 females, Water Valley, 6-X-1970, 27-V-1971, M. Horan. TENNESSEE. Hen-

derson Co.: 5 females, Natchez Trail State Park, 1-21-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

3. *Barichneumon libens* (Cresson)
Map 90

Ichneumon libens Cresson, 1877:181, male.

Melanichneumon libens, Townes and Townes, 1951:286, male.

Melanichneumon (*Barichneumon*) *libens*, Heinrich, 1962:627, male (nec female!).

?*Melanichneumon* (*Barichneumon*) *sorex* Heinrich, 1962:624, female.

Barichneumon libens, Heinrich, 1972:191-192, female, male.

Holotype: male, Illinois; ANS. Neallotype: female, Maine; CGH II.

SYSTEMATICS: The average size of females of this species is the smallest among the North American species of this genus; they are distinguished by the combination of the following characters: (1) size 5-7 mm; (2) gastrocœli obsolete or barely indicated; (3) color of the entire body, including legs, almost uniformly orange, with the frontal and vertical orbits always broadly ivory, the outer orbits never ivory marked; (4) apices of femora III and of tibiae III in majority of specimens slightly infuscated; (5) flagellum exactly filiform, slender, with, as a rule, 26 segments.



Map 89. *Barichneumon sphageti crassipunctatus* Heinrich

Males are geographically and individually rather constant in color and are distinguished by (1) small, short-oval spiracles of propodeum, about 4 times as long as medially wide; (2) 2 short, median, ivory stripes on mesoscutum; (3) pentagonal areolet, with intercubiti less strongly narrowed in front than in most other species; (4) subobsolete gastrocoeli. Chromatically most similar to *neosorex* Heinrich, but distinguishable at once by the completely different tyloids, and also by the never black marked malar space.

FEMALE: Length 5-7 mm. Ferruginous orange, the following ivory: frontal and vertical orbits broadly, collare, apex of pronotal ridge, subalarum; scutellum sometimes ivory tinged apically; abdomen without apical ivory mark; apices of femora III and of tibiae III frequently slightly infuscated, particularly in northern populations; flagellum black, with dorsal white annulus on segments 7-12; segments before annulus, as a rule, brownish, at least apically, lighter brown on ventral side than on the dorsal side; scape ventrally orange, dorsally blackish.

FLAGELLUM: Exactly filiform, slender, not widened beyond middle, with 25 segments, the 1st nearly twice as long as apically wide, in lateral view the 6th square, none wider than long.

HEAD: Temple profile somewhat narrowed behind eyes, distinctly curved; cheek profile markedly narrowed toward mandible base, almost straight; malar space slightly longer than width of mandible base; median field of face and lower parts of lateral fields somewhat protruding; clypeus slightly convex, the apical margin narrowly depressed.

THORAX: Mesoscutum flat, rather densely punctured, shiny between punctures; scutellum flat, laterally carinate at base; carination of propodeum distinct and complete; area posteromedia slightly longer than horizontal part of propodeum medially; areae dentiparae not downward slanting; area superomedia hexagonal, strongly narrowed toward area basalis, longer than wide; spiracles of propodeum small, about 4 times as long as wide.

ABDOMEN: Gastrocoeli and thyridia rather indistinct or obsolete; postpetiole with weakly indicated median field; tergites 2-3 coarsely and densely punctured, the 4th (somewhat less coarsely) punctured to about middle.

MALE: Length 6-7 mm. Head white, antennal cavities, broad middle of frons,

ocellar and occipital regions black; sterna ivory markings; the following ivory: collare, pronotal ridge and base broadly, subalarum, ivory markings; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae, 2 short, median (usually apically confluent), longitudinal lines on mesoscutum, usually also at least an indication of 2 short, lateral stripes on mesoscutum, usually marks on prescutellar carinae, always scutellum, postscutellum, and 2 lateral marks on propodeum (covering the areae posteroexternae together with the apices of areae dentiparae, the apical part of areae spiraculiferae, and sometimes also apical marks on areae metapleurales); the uppermost part of mesopleura below subalarum black, the speculum usually orange, often together with a narrow band between black upper and ivory lower part of mesopleura; basic color of propodeum orange, the area posteromedia black, in northern populations usually also the area superomedia black; legs orange, including coxae III; coxae and trochanters I and II white; coxae III never white marked on dorsal side, but usually white apically or for entire length on ventral side; apices of femora III and of tibiae III usually not infuscated in southeastern populations, usually infuscated in northeastern populations; abdomen uniformly orange; flagellum black, ventrally pale ochreous, scape ventrally white.

FLAGELLUM: With 28 segments and with narrow, bacilliform tyloids on segments 5-12, the longest reaching bases and apices of segments.

HEAD: Temple profile only slightly narrowed behind eyes, distinctly curved; cheek profile, in front view, in gradual curve rather strongly narrowed toward mandibles, making the outline of head nearly circular; malar space less than 1/2 as long as width of mandible base.

THORAX: Notauli indicated at base only; sternauli on mesosternum moderately distinct; scutellum slightly raised above postscutellum, with gentle apical slope and with sharp, lateral edges to about middle; area superomedia usually slightly longer than wide, with (oblique) costulae slightly before middle, approximately hexagonal, narrowed from costulae toward base; spiracles small, about 4 times as long as wide.

LEGS: Moderately stout.

ABDOMEN: Postpetiole with faintly indicated median field, moderately densely and coarsely punctured, polished between punctures; sculpture of tergites 2-4 the same, the

basal 1/4 of the 5th tergite somewhat finer punctured; gastrocoeli and thyridia very small but recognizable at 60 times magnification.

DISTRIBUTION (map 90): Maine, west to Illinois, south to Georgia, Mississippi, Louisiana, and Arkansas. ARKANSAS. Garland Co.: 3 females, Ouachita State Park, 3-29-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: 1 female, Gainesville, 13-V-1962, F. Mead. Clay Co.: 1 female, Gold Head Branch State Park, 28-IV-1971, G. Heinrich. Highlands Co.: 3 males, Archbold Biological Station, IV-V-1968, G. Heinrich. Lee Co.: 5 females, 10 males, Fort Myers, 21-II-2-IV-1968, G. Heinrich. Liberty Co.: 2 males, Torreya State Park, 16-IV-11-V, R. Woodruff, G. Heinrich. GEORGIA. Monroe Co.: 1 female, Forsyth, 14-22-V-1971, F. Naumann. LOUISIANA. Evangeline Co.: 5 females, 2 males, Bayou Chicot, 13-III-1-IX-1971-1972, D. Shaneck, Natchitoches Co.: 1 female, Natchitoches, 14-22-V-1971, G. Heinrich. Webster Co.: 3 females, 1 male, Bistineau State Park, 16-30-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Yalobusha Co.: 2 females, 1 male, Water Valley, 11-28-IV-1971, M. Horan. TENNESSEE. Henderson Co.: 4 females, 1 male, Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.



Map 90. *Barichneumon libens* (Cresson)

4. *Barichneumon neosorex* Heinrich Figs. 40-42, Map 91

Barichneumon neosorex Heinrich, 1972:185 (female, key), 189 (male, key), 195-196, female, male.

Holotype: male, Florida; CGH II. Allotype: female, Florida; CGH II.

SYSTEMATICS: Males of this species are uniquely and unmistakably distinguished by the shape of the tyloids (fig. 40). They are chromatically rather similar to *archboldi* Heinrich and *libens* (Cresson); distinguished from these 2 species (in addition to the unique character of the tyloids) by the considerably more narrowed cheek profile (from *archboldi*) toward mandible base, and by the black-marked malar space (from *libens*).

The female is less strikingly characterized and consequently not as easily identifiable; it is distinguished by the combination of the following characters: (1) orbits constantly broadly ivory all around eyes, except on malar space; (2) scutellum weakly carinate laterally at the base only; (3) flagellum filiform, with only apical segment tapering toward apex.

FEMALE: Length 7-8 mm. Orange ferruginous, with restricted ivory and practically without black markings; the following ivory: orbits broadly around eyes (except on malar space), collare, pronotal ridge narrowly toward apex, subalarum, and sometimes pronotal base narrowly and in part; the following black; sometimes base of prepectus restrictedly, axillary troughs, and basal furrow of propodeum medially; flagellum black, with dorsal white annulus on segments 5 (apex) or 6 or 7 to 12; basal segments ventrally sometimes brownish; scape uniformly orange.

FLAGELLUM: Filiform, the apical segment tapering toward its apex, not widened beyond the middle, with 25-26 segments, the 1st about twice as long as apically wide, in lateral view the 6th square, none wider than long.

HEAD: Temple profile distinctly narrowed behind eyes, slightly curved; cheek profile markedly narrowed toward mandible base, straight; malar space about as long as width of mandible base; median field of face moderately protruding, lower parts of lateral



Fig. 40. *Barichneumon neosorex* Heinrich (male). Tyloids on flagellar segments 4-12.

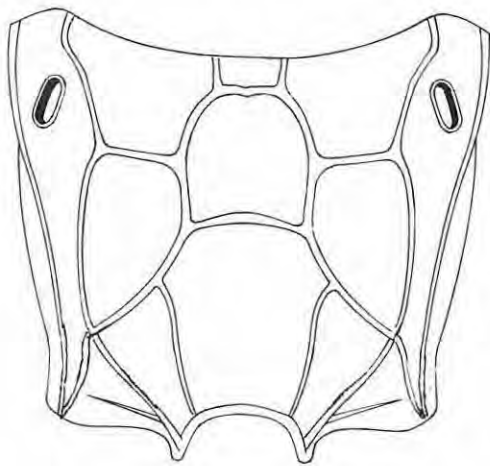


Fig. 41. *Barichneumon neosorex* Heinrich (female). Propodeum, dorsal view.

fields slightly protruding; frons and vertex densely and distinctly punctured.

THORAX: Mesoscutum slightly convex, densely and coarsely punctured, glossy between punctures; notauli indicated only at the extreme base; scutellum flat, also densely punctured, laterally weakly carinate at base; area postermedia slightly longer than horizontal part of propodeum medially; area superomedia usually somewhat longer than wide, hexagonal (fig. 41), with oblique costulae in or slightly beyond middle, narrowed from costulae toward area basalis; propodeum coarsely and densely punctured, except area superomedia nearly impunctate; areae dentiparae not drawn out into long, narrowed apices and not slanting downward toward base of coxae III; mesopleura coarsely and densely punctate rugose, with small, smooth speculum.

LEGS: Moderately stout; coxae III ventrally densely punctured, without scopa.

ABDOMEN (fig. 42): Gastrocoeli and thyridia subobsolete, the former indicated by a tiny impression; tergites 1-3 coarsely and fairly densely punctured, polished between punctures, basal 1/2 of 4th tergite more finely punctured.

MALE (table 9): Length 7-9 mm. Head white including mandibles; the following black: antennal cavities, middle of frons broadly, ocellar and occipital regions, and always a mark on malar space; basic color of pronotum, mesoscutum, and of the horizontal part of propodeum black; the following white: collare, pronotal ridge and base broadly, subalarum, tegulae, 2 short median lines on mesoscutum, sometimes also 2 very short (often indistinct) lateral lines on mesoscutum, scutellum, postscutellum, areae posteroexternae, apical 1/2 (or most) of areae dentiparae, areae spiraculiferae in variable extent (only apically to predominantly, except only a blackish or orange mark beyond spiracles), exceptionally areae metapleurales apically, prosternum (except sometimes the black base), mesosternum including mesolcus, prepectus predominantly (or only its exterior belt), mesopleura, except about black upper 1/3 and black mark in front of coxae II, and carinal triangle; always black are: area superomedia (often apically brown or orange), areae coxales, superoexternae, and area basalis; usually black are area posteromedia (often extensively brown or orange) and bases of areae dentiparae (usually shading into brown or orange toward white apical section); areae metapleurales predominantly ferruginous; legs orange, the following white: coxae and trochanters I and II entirely, ventral side of coxae III, and large dorsal mark on interior side of coxae III; tibiae III usually slightly infuscated apically, tarsi III blackish, tarsi II usually slightly infuscated; abdomen orange, postpetiole with apical ivory band or apico-

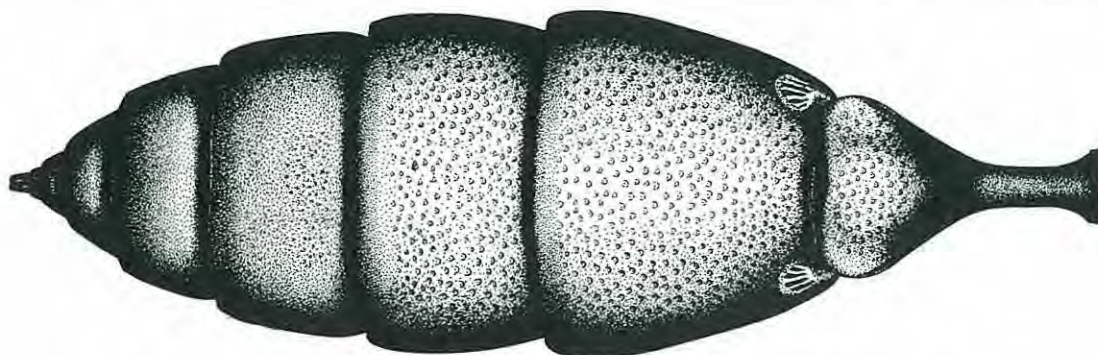


Fig. 42. *Barichneumon neosorex* Heinrich (female). Abdomen, dorsal view.

TABLE 9. Distribution of white on 13 males of *Barichneumon neosorex* Heinrich

No. specimens	Distribution of white
13	head, except middle of frons, ocellar and occipital regions and malar space
13	collare, pronotal ridge, pronotal base, subalarum, and tegulae
13	2 median lines on mesoscutum
5	also 2 short lateral lines on mesoscutum
13	scutellum and postscutellum
9	prosternum entirely
4	prosternum except black base
13	mesosternum entirely
12	exterior belt of prepectus more or less extensively
13	inferior about 2/3 of mesopleura except black mark before coxae II
1	area metapleuralis basally and apically
1	apical 1/2 or more of areae dentiparae
13	areae parateroexternae entirely
3	less than apical 1/2 of areae spiraculiferae and dot on spiracles
10	areae spiraculiferae predominantly, except only ferruginous or infuscated patch beyond spiracles
13	coxae and trochanters I and II entirely
13	dorsal mark and ventral side of coxae III
13	apical band or lateral marks on postpetiole
10	apical band on 2nd tergite
6	apical band on 3rd tergite
2	apical band on 4th tergite

lateral ivory marks, usually also the 2nd tergite apically ivory, rarely the 3rd and 4th; flagellum black, ventrally pale brown, without annulus; scape ventrally ivory.

FLAGELLUM: With 27-28 segments and with tyloids of striking shape and size (fig. 40) on segments 4-12, the longest, on segments 5-11 covering the entire length of segments; tyloids elongate elliptic, almost parallel sided and unusually wide.

HEAD: Malar space about 1/3 as long as width of mandible base; temple profile

scarcely narrowed behind eyes, distinctly curved.

THORAX: About anterior 1/4 of notauli distinct; scutellum moderately raised above postscutellum, apically truncate and gently sloping down, with sharp lateral edges nearly to the middle, area superomedia hexagonal, about as long as wide, with costulae close to middle; mesopleura evenly, moderately finely, and fairly densely punctured, smooth between punctures, with fairly large, smooth speculum; spiracles of propodeum fairly long, about 6-7 times as long as wide.

ABDOMEN: Postpetiole fairly densely punctured, with slightly indicated median field; gastrocoeli and thyridia very small, indistinct.

DISTRIBUTION (map 91): ARKANSAS. Garland Co.: 4 females, 2 males, Ouachita State Park, 12-29-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 12 females, 65 males, Gold Head Branch State Park, 22-29-IV-1971, G. Heinrich, D. Radtke. Duval Co.: 4 males, Jacksonville, 12-V-1971, C. Zeiger. Highlands Co.: 3 males, Archbold Biological Station, 13-IV-1968, G. Heinrich; 1 male, Highlands Hammock State Park, 24-IV-1968, G. Heinrich. Lee Co.: 4 females, 12 males, Fort Myers, III-V-1968, G. Heinrich, D. Radtke. Liberty Co.: 1 female, 6 males, Torreya State Park, V-1968, G. Heinrich. GEORGIA. Monroe Co.: 26 females, 192



Map 91. *Barichneumon neosorex* Heinrich

males, Forsyth IV-III-1970-1971, F. Naumann. LOUISIANA. Evangeline Co.: 4 females, 11 males, Chicot State Park, 22-V-1-VI-1971, G. Heinrich. Natchitoches Co.: 2 females, Natchitoches, 14-VI-1971, G. Heinrich; 3 females, 1 male, Powhatan, 11-18-VI-1971, G. Heinrich. TENNESSEE. Henderson Co.: 6 females, 1 male, Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

5. *Barichneumon archboldi* Heinrich

Fig. 43, Map 92

Plate 3

Barichneumon archboldi Heinrich, 1972:196-197, female, male.

Holotype: male, Florida; CGH II. Allotype: female, Florida; CGH II.

SYSTEMATICS: This species is slightly larger than all other southeastern forms of the genus. Both sexes are distinguished particularly by the structure of the head: the cheek profile in front view is very wide and barely narrowed toward mandible base, with extremely abbreviated malar space. The female is chromatically distinguished by broadly ivory pronotal ridge, combined with ivory scutellum and postscutellum. Males are rather similar in color pattern to *neosorex*, but recognizable at once by narrow, normally-shaped tyloids (cf. fig. 43, 40) and also by considerably wider cheek profile.

All males from Florida are chromatically rather homogenous; the series of 9 males from central Louisiana shows, however, a rather wide range of variability, particularly of the color of the mesoscutum, coxae III, and propodeum; these males may represent a different subspecies. See tables 10 and 11 of distribution of color at the end of this treatment.

The species *soror* Cresson of the north-eastern fauna is amazingly similar in structure to *archboldi*, though quite different in color; nevertheless, it seems possible, that the 2 species represent associated, vicariant forms.

FEMALE: Length 10 mm. Ferruginous orange, with rich ivory and restricted black markings; the following ivory: orbits broadly around eyes (except only on malar space), collare, pronotal ridge broadly for entire length, pronotal base, subalarum, scutellum,



Fig. 43. *Barichneumon archboldi* Heinrich (male). Tyloids on flagellar segments.

postscutellum, areae posteroexternae together with extreme apices of areae dentiparae, coxae I and II apically, apical margin of 1st trochanters I and II dorsally, and long dorsal mark on interior side of coxae III; the following black: base of prosternum, entire prepectus, longitudinal, median band on mesosternum, middle of pronotum behind collare, narrow band below subalarum, margin of mesoscutum narrowly all around, basal furrow of scutellum, axillary troughs, basal furrow of propodeum narrowly all around, apical mark on area posteromedia, base of petiole, and base of 1st trochanters III; flagellum black, with dorsal white annulus on segments 6-13; scape ventrally ferruginous.

FLAGELLUM: Subfiliform, slightly widened beyond middle and slightly tapering toward apex, with 30 segments, the 1st fully twice as long as apically wide, in lateral view the 6th square, the widest on the flat side about 1.5 times as wide as long.

HEAD: Temple profile scarcely narrowed behind eyes, distinctly curved; head, in front view, rather wide, with strongly transverse face and clypeus, the cheek profile only slightly narrowed toward mandibles, slightly curved; malar space short, only about 1/2 as long as width of mandible base; median field of face and lower parts of lateral fields distinctly protruding; clypeus slightly convex, about 4 times as wide as medially long; face and clypeus coarsely and moderately densely punctured.

THORAX: Mesoscutum slightly convex, coarsely and fairly densely punctured, polished between punctures; about anterior 1/4 of notauli distinct; scutellum not quite flat, with lateral carinae indicated at the base only; area posteromedia slightly longer than horizontal part of propodeum apically; area superomedia about as long as apically wide, hexagonal, narrowed from costulae toward area basalis; areae dentiparae not slanting downward.

LEGS: Stout; femora III in lateral view about 3.5 times as long as medially wide; coxae III ventrally rather densely and moderately coarsely punctured.

ABDOMEN: Postpetiole and tergites 2 and 3 coarsely and densely punctured, the basal 1/2 of 4th tergite less coarsely and less densely punctured; gastrocoeli triangular, fairly deeply impressed; thyridia fairly distinct.

MALE (tables 10, 11): Length 9-11 mm. Head white, the following black: antennal cavities, broad middle of frons, ocellar and

occipital regions, and a mark on malar space; thorax, abdomen, and legs ferruginous, with rich ivory markings and some black parts; the following ivory: collare, pronotal ridge and base, subalarum, mark on tegulae, 2 median, longitudinal (often apically confluent) lines on mesoscutum, usually also 2 short lateral lines on mesoscutum (near tegulae), scutellum, postscutellum, 2 large marks on propodeum (covering the areae posteroexternae together with most of the areae dentiparae, the apical parts of the areae spiraculiferae, and usually also in lesser extent the apical parts of areae metapleurales), carinal triangle, usually a mark in front of the spiracles of propodeum, prosternum except base, mesosternum except median furrow, exterior belt of prepectus all around, coxae and trochanters I and II uniformly, coxae III extensively to predominantly, usually apical band on postpetiole, sometimes also on 2nd and 3rd tergites; the following black: propleura, mesoscutum all around more or less extensively (the median lobe particularly so), longitudinal band on upper part of mesopleura (the speculum usually ferruginous), prepectus (except the ivory exterior belt), mark on mesopleura in front of coxae II, base of prosternum, basal furrow of scutellum, axillary troughs, basal furrow of propodeum, entire areae superoexternae, superomedia, posteromedia, and coxales, bases of areae dentiparae and spiraculiferae more or less extensively; areae metapleurales usually ferruginous (partially black basally and apically), petiole more or less extensively, coxae III and 1st trochanters III more or less extensively, apices of femora III and of tibiae III, and the tarsi III; flagellum black, without white annulus, ventrally light brown; scape ventrally ivory.

FLAGELLUM: With 31-33 segments and with long and narrow tyloids (fig. 43) on segments 6-12 or 13.

HEAD: Temple profile, in vertical view, scarcely narrowed behind eyes, with distinctly curved outline; malar space subobsolete, less than $1/3$ as long as width of mandible base.

THORAX: Anterior $1/3$ of notauli very distinct; scutellum somewhat raised above postscutellum and convex, laterally carinate to about middle; area superomedia hexagonal, usually somewhat wider than long, with costulae before middle.

ABDOMEN: Gastrocoeli small, triangular, distinct.

TABLE 10. Distribution of white and ferruginous color on 15 males of *Barichneumon archboldi* Heinrich from Florida.

No. specimens	Distribution of white
4	head, except black middle of frons, occipital and frontal regions, including malar space
11	head as before, but malar space black marked
15	collare, pronotal ridge, and pronotal base
15	prosternum except black base to basal $1/2$
15	2 median lines on mesoscutum
8	2 short lateral lines on mesoscutum
15	scutellum, postscutellum, and subalarum
15	mesosternum except more or less extensive longitudinal median black line
15	mesopleura except longitudinal black, or black and ferruginous band on superior part
15	exterior belt around prepectus
15	mark on tegulae
15	areae dentiparae entirely or except narrow base
15	areae posteroexternae entirely
15	about apical $1/2$ to apical quarter of areae spiraculiferae
15	very small mark on or before spiracles
5	areae metapleurales apically
1	areae metapleurales predominantly
15	carinal triangle partially or entirely
15	coxae and trochanters I and II
15	coxae III dorsally extensively to predominantly
9	coxae III ventrally for nearly the entire length
6	coxae III ventrally restrictedly at apex only
2	1st trochanters III extensively
15	apical band on 1st tergite
4	apical band also on tergites 2 and 3
1	apical band also on 4th tergite

(continued next page)

Table 10 continued
Distribution of ferruginous

8	mesoscutum on exterior side of the 2 median white stripes more or less extensively
7	areae dentiparae basally
5	areae spiraculiferae medially more or less extensively
4	areae metapleurales medially more or less extensively
6	areae metapleurales predominantly
1	areae metapleurales entirely
6	basic color of coxae III entirely
6	basic color of coxae III ferruginous with black parts
3	basic color of coxae III black only
11	black longitudinal band on upper part of mesopleura with ferruginous mark on apical part

DISTRIBUTION (map 92): Central Florida and Louisiana. FLORIDA. Highlands Co.: 11 males, Archbold Biological Station, 17-II-8-VI-1967-1968, G. Heinrich, S. Frost (in light trap). Lee Co.: 1 female, 7 males, Fort Myers, 7-III-22-IV-1967-1968, G. Heinrich, D. Radtke. LOUISIANA. Evangeline Co.: 9 males, Eola, 15-V-4-VII-1972, D. Shaneck. All specimens in CGH II.



Map 92. *Barichneumon archboldi* Heinrich

TABLE 11. Distribution of white marks on mesoscutum, and distribution of ferruginous pattern on thorax and coxae III of 9 males of *Barichneumon archboldi* Heinrich from Louisiana

No. specimens	Distribution of white
4	mesoscutum uniformly black
2	mesoscutum with 2 short, longitudinal, median, white lines
3	mesoscutum with 4 distinct, short, longitudinal, white lines

Distribution of ferruginous

2	mesoscutum medially with indistinct, small, ferruginous mark
7	mesoscutum of completely black basic color
7	areae dentiparae basally ferruginous
6	areae spiraculiferae medially more or less restrictedly ferruginous
1	areae metapleurales with minor ferruginous mark
6	areae metapleurales predominantly ferruginous
2	areae metapleurales entirely ferruginous
4	basic color of coxae II entirely ferruginous
2	basic color of coxae III ferruginous combined with black
3	basic color of coxae III black only
8	mesopleura with a ferruginous mark on area of speculum

6a. *Barichneumon peramoenus peramoenus* Heinrich
Fig. 44-46, Map 93

Melanichneumon (subgenus?) *peramoenus* Heinrich, 1962:631-632, male.

Barichneumon peramoenus Heinrich, 1972: 192-193, female, male.

Holotype: male, Quebec; CGH II. Neallotype: female, Massachusetts; CGH II.

SYSTEMATICS: Males of this species are distinguished decisively by the combination of the 2 chromatic characters: (1) basic color of mesoscutum black, with 2 longitudinal, median, ivory stripes, ivory prescutellar

carinae, and 2 short, lateral, ivory stripes connecting the ivory prescutellar carinae and the tegulae; (2) flagellum always with conspicuous, white annulus. Among all the eastern males only 1 species shares the flagellar annulus with *peramoenus*: *floridanus* Heinrich, which differs unmistakably by uniformly orange mesoscutum.

Females are less strikingly characterized by the following characters: (1) flagellum subbristle shaped, fairly stout, but gradually distinctly tapering toward apex and moderately widened beyond middle; (2) scutellum flat, with distinct, though low, lateral carinae to the middle or beyond; (3) horizontal part of propodeum medially fully as long as area posteromedia; (4) area superomedia hexagonal, usually distinctly longer than wide; (5) at least vertical orbits ivory, often also frontal orbits; (6) apical and often also lateral margins of scutellum more or less distinctly ivory tinged.

The wide range of the species is divided between 2 distinct subspecies, differing only slightly in females, strikingly in males. One of the 2 subspecies is confined to Florida, the other occupies the other southeastern states northward, to eastern Canada.

Females and males differ from the following subspecies by the femora and tibiae III apically more or less extensively blackish infuscated; males in addition rather strikingly different by the extensively black- and orange-banded tergites 2-5, with the tergites 2-4 tricolored, with ivory apical bands beyond orange sections.

FEMALE: Length 7-8 mm. Ferruginous orange; apices of femora III and of tibiae III more or less extensively blackish, tarsi III usually also infuscated; the following ivory: at least vertical orbits (usually also frontal orbits), base of mandibles, collare, pronotal ridge, sides and apical margin of scutellum more or less distinctly; in southern specimens trochanters I and II, often also coxae I and II, trochanters III, postscutellum, and subalarum ivory tinged; the following black: base of prepectus, axillary troughs, and basal furrow of propodeum; in neallotype and in northern specimens also the following parts black: prosternum, middle of mesosternum, propleura, areae coxales, and parts of coxae III; flagellum black, with dorsal white annulus on segments 7 or 8 to 13 or 14; scape orange.

FLAGELLUM: Subbristle shaped, fairly stout, moderately widened beyond middle, gradually tapering toward apex, with 28-30 segments, the 1st about twice as long as

apically wide, in lateral view the 6th or 7th square, the widest on the flat side about 1.5 times as wide as long.

HEAD: Temple profile (fig. 44) in vertical view strongly narrowed behind eyes, straight; cheek profile also strongly narrowed toward mandible base; malar space slightly longer than width of mandible base; clypeus slightly convex, as are also median field of face and lower parts of lateral fields of face; face receding from facial arch toward margin of clypeus; face, clypeus, and frons coarsely and densely punctured, the frons more densely than the face.

THORAX: Mesoscutum flat; notauli indicated only at the extreme base; scutellum depressed, with distinct, though low, lateral carina to about middle or beyond; horizontal part of propodeum (as in fig. 45) about as long as area posteromedia; area superomedia longer than wide, with costulae at or before middle, parallel sided behind costulae, narrowed from costulae toward area basalis; apices of areae dentiparae pointed, but not tangibly projecting and not slanting downward; speculum polished, rest of pleura and the mesoscutum coarsely and fairly densely punctured, the latter polished between punctures.

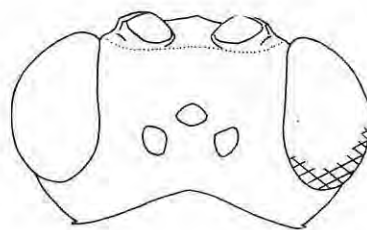


Fig. 44. *Barichneumon peramoenus peramoenus* Heinrich (female). Head, dorsal view.

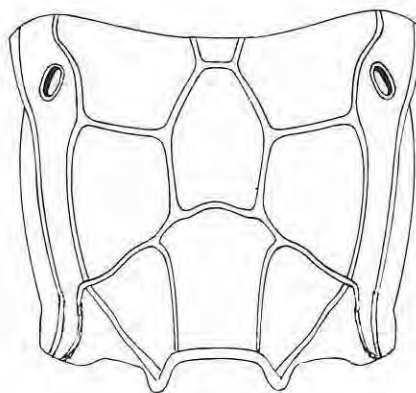


Fig. 45. *Barichneumon peramoenus calliandros* Heinrich (female). Propodeum, dorsal view.

LEGS: Moderately stout.

ABDOMEN: Postpetiole with slightly raised but not clearly defined median field, coarsely and densely punctured; gastrocoeli small, short, and narrow, with distinct thyridia; tergites 2 and 3 coarsely and densely punctured, extremely finely coriaceous between punctures; the 4th tergite only basally with some fine puncturation.

MALE: Length 9-10 mm. Head ivory, the following black: antennal cavity, broad middle of frons, ocellar and occipital regions; thorax black, with very rich ivory pattern; the following ivory: collare, pronotal ridge and base, subalarum, tegulae in part, 2 short, median lines on mesoscutum, prescutellar carinae, 2 short, lateral lines on mesoscutum (extending from prescutellar carinae to tegulae), scutellum, postscutellum, carinal triangle, 2 large marks on propodeum (covering the areae posterexternae together with most of areae dentiparae and areae spiraculiferae, and an apical mark on areae metapleurales), prosternum except base, exterior belt all around prepectus, mesosternum, and most of mesopleura (except black mark in front of coxae II and black band covering about upper 1/3 including speculum); abdomen tricolored: tergites 1-4 or 5 or 6 basally black, 1-4 with apical ivory bands and lateral surfaces (the petiole usually also basally ivory), tergites 2-4 orange red between black basal and ivory apical bands, tergites 5-7 uniformly orange red, except basal black bands on the 5th and sometimes also on the 6th tergite; legs I and II ivory, the femora and tibiae faintly orange tinged on dorsal side; legs III tricolored, the femora III orange red, apically black, the coxae III laterally and dorsally more or less extensively black, ventrally ivory, and with large ivory mark on dorsal side; tibiae III, tarsi III, and trochanters III ivory, tibiae III with broadly black apices, apices of all segments of tarsi III broadly black, the apical segments usually entirely black, 1st trochanters III on dorsal side with basal black mark or more extensively black; flagellum black, ventrally pale ochreous, with white annulus on segments 13 or 14 to 17 or 18; scape ventrally ivory.

FLAGELLUM: With 31-33 segments and with narrow, bacilliform tyloids (as in fig. 46) on segments 5 or 6 to 15 or 16, the longest not reaching to bases and apices of segments.

HEAD: Temple profile moderately narrowed behind eyes, with curved outline; malar space about 1/2 as long as width of

mandible base; clypeus convex; median field of face slightly protruding.

THORAX: Mesoscutum moderately convex, coarsely and densely punctured; about anterior 1/4 of notauli fairly distinct; scutellum slightly raised above postscutellum, apically truncate and gradually sloping toward postscutellum, dorsally slightly convex, laterally carinate to about middle; area superomedia usually slightly longer than wide, with costulae distinctly before middle, slightly narrowed from costulae toward area basalis.

ABDOMEN: Median field of postpetiole fairly clearly indicated though not sharply defined; tergites 1-5 coarsely and fairly densely punctured, shiny between punctures; gastrocoeli small but fairly deeply impressed.

DISTRIBUTION (map 93): Quebec and Ontario, to southern Georgia and Louisiana. ARKANSAS. Garland Co.: 4 females, Ouachita State Park, 9-29-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Clarke Co.: 2 females, Athens, 1-VI-1969, G. Heinrich. Monroe Co.: 25 females, 11 males, Forsyth, 6-III-31-X-1969-1971 (inclusive months, except VII), G. Heinrich, F. Naumann. LOUISIANA. Evangeline Co.: 11 males, Chicot State Park, 24-V-13-X-1971, G. Heinrich, D. Shaneck. Natchitoches Co.: 5 males, Powhatan, 13-16-VI-1971, G. Heinrich. Webster Co.: 1 female, 1 male, Bistineau State Park, 16-IV-5-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Lafayette Co.: 11 males, Water Valley, 11-V-



Map 93. *Barichneumon peramoenus peramoenus*
Heinrich

6-VII-1970, M. Horan. Oktibbeha Co.: 2 females, 3 males, Starkville, 16-IV-11-VI, and 26-IX-10-X-1971, C. Sartor. Yalobusha Co.: 5 females, 4 males, Water Valley, 7-VII-23-XI-1970, M. Horan. TENNESSEE. Henderson Co.: 3 females, 1 male, Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

6b. *Barichneumon peramoenus calliandros* Heinrich

Fig. 44-46, Plate 4, Map 94

Barichneumon peramoenus calliandros Heinrich, 1972:193-194, female, male.

Holotype: female, Florida; CGH II. Allotype: male, Florida; CGH II.

SYSTEMATICS: Females of this subspecies differ from the nominate form only slightly, and only chromatically, not at all in structure; in contrast to the nominate form the apices of femora III, tibiae III, and tarsi III are not infuscated.

Males (table 12) are rather strikingly distinguished from *peramoenus peramoenus* by the complete absence of black pattern on abdomen and on legs III.

FEMALE: Length 7-8 mm. Orange ferruginous; apices of femora III and of tibiae III not infuscated; the following ivory: vertical orbits, sometimes also frontal orbits narrowly, base of mandibles, collare, extreme end of pronotal ridge (rarely pronotal ridge more extensively), subalarum, apical, and usually also lateral, margins of scutellum more or less indistinctly, rarely postscutellum, trochanters I and II, coxae I extensively to predominantly, and apices of coxae II; flagellum with white annulus.

MALE (table 12): Length 7-10 mm. Head and thorax, with all ivory markings and black parts as in the nominate form; abdomen orange, without black marks, tergites 1-3 or 4 with apical ivory bands; coxae, femora, and tibiae III orange without black parts, except usually a small, dorso-apical black mark on coxae III and dorso-basal black mark on 1st trochanters III; the extreme tip of tibiae III often slightly infuscated, base of tibiae III narrowly ivory; ivory parts on coxae III as in nominate form; tarsi III ivory, without infuscations, the basal segments orange tinged; the rest as in nominate form; area metapleuralis and speculum sometimes orange.

DISTRIBUTION (map 94): Florida as follows: Alachua Co.: 1 male, Gainesville, 3-V-1968, G. Heinrich. Clay Co.: 5 males, Gold Head Branch State Park, 12-IV-2-V-1971, G. Heinrich. Highlands Co.: 12 females, 51



Map 94. *Barichneumon peramoenus calliandros* Heinrich



Fig. 46. *Barichneumon peramoenus calliandros* Heinrich (male). Tyloids on flagellar segments.

males, Archbold Biological Station, 7-III-28-V-1967-1968, G. Heinrich; 3 females, 17 males, Highlands Hammock, 24-IV-1968, 19-VIII-21-XI-1969, G. Heinrich, R. Miller. Hillsborough Co.: 1 male, Hillsborough River State Park, 9-V-1971, G. Heinrich. Lee Co.: 2 females, 12 males, Fort Myers, 27-V-29-VI-1967, G. Heinrich, D. Radtke. All specimens in CGH II.

TABLE 12. Distribution of ivory and ferruginous markings on 30 males of *Barichneumon peramoenus calliandros* Heinrich

No. specimens	Distribution of ivory
30	head, except black middle of frons, occipital and temple regions
30	collare, pronotal ridge, and pronotal base
30	prosternum
30	2 longer median lines and 2 short lateral lines on black mesoscutum
30	prescutellar carinae, scutellum and postscutellum
30	subalarum

(continued on next page)

Table 12 continued

No. specimens	Distribution of ivory
30	mesosternum and more than lower 1/2 of mesopleura
30	exterior belt around prepectus
28	mark on tegulae
1	tegulae entirely
1	tegulae not white marked
28	about apical 1/2 of areae dentiparae
2	areae dentiparae entirely
30	areae posteroexternae entirely
29	areae spiraculiferae except infuscated or ferruginous patch above spiracles
1	only apical 1/2 of areae spiraculiferae
11	apical part of areae metapleurales more or less extensively
2	about apical 1/2 of areae spiraculiferae
30	carinal triangle
30	coxae III dorsally on inner side extensively
30	coxae III ventrally for entire length
30	coxae and trochanters I and II entirely
30	trochanters III extensively to predominantly
13	tarsi III except basal part of metatarsus and apical part of the 5th segment
17	tarsi III less extensively
30	tarsi I and II more or less extensively
22	base of tibiae III narrowly, but distinctly
8	base of tibiae III indistinctly
—	ventral side of femora and tibiae I and II varying from white for entire length to not white at all (not counted)
30	apical band on 1st tergite
21	sides of 1st tergite for entire length
9	sides of postpetiole only
26	apical band on 2nd tergite
10	apical band on 3rd tergite
5	apical band on 4th tergite

Distribution of ferruginous

3	temple region partially
25	area of speculum on mesopleura with ferruginous patch:
15	a. with white spot
10	b. without white spot
5	area of speculum with white spot surrounded by black
18	metapleura extensively to predominantly
1	metapleura entirely
22	areae dentiparae basally
8	area superomedia apically
30	basic color of coxae III and all tibiae and femora
30	abdomen light ferruginous except white markings

7. *Barichneumon floridanus* Heinrich Map 95

Barichneumon floridanus Heinrich, 1972: 198-199, female, male.

Holotype: male, Florida; CGH II. Allotype: female, Florida; CGH II.

SYSTEMATICS: Females are rather unobtrusive in color and structure; they are similar in appearance to the preceding subspecies, *peramoenus calliandros*, but well distinguished from that form by the combination of the following characters: (1) apices of areae dentiparae drawn out, elongate, narrowed, and slanting down toward coxae III; (2) scutellum laterally not at all carinate; (3) flagellum exactly filiform, not narrowed toward the end; (4) puncturation of the 2nd, and particularly of the 3rd tergite, considerably finer than in all similar species; (4) temple profile and cheek profile rather strongly narrowed behind eyes and toward mandibles respectively, straight.

Males share the white flagellar annulus (in the eastern fauna of the genus) only with *peramoenus*; they differ from that species strikingly by uniformly orange mesoscutum; they share the latter character only with the following species, *carolinensis* Heinrich, from which they can be distinguished easily by the white flagellar annulus and the not ivory-marked prescutellar carinae and coxae III.

FEMALE: Length 8 mm. Pale orange (head and mesoscutum a shade darker than the rest), with restricted ivory marks; ivory are only: a short, unobtrusive line on vertical orbits, collare, extreme end of pronotal ridge,

and subalarum; scutellum, coxae I and II, all trochanters, and the 7th tergite ivory-tinged orange; extreme apex of tibiae III dorsally infuscated; flagellum black, with dorsal white annulus on segments 7-12 or 13, ventrally brownish; scape orange, dorsally infuscated toward apex.

FLAGELLUM: Filiform, not attenuated toward apex, slightly widened beyond middle and slightly narrowed toward base, with 26-27 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 5th square, the widest, on the flat side, nearly 1.5 times as wide as long.

HEAD: Temple profile and cheek profile markedly narrowed behind eyes and toward mandibles respectively, straight; median field of face barely protruding; clypeus not convex.

THORAX: Scutellum not depressed, without sharp lateral edges or carinae; horizontal part of propodeum slightly shorter than area posteromedia; area superomedia similar to *peramoenus*, longer than wide, with costulae before middle, strongly narrowed from costulae toward area basalis; area posteromedia not parallel sided, but markedly widened toward area superomedia; areae dentiparae decisively different from *peramoenus*: their pointed apices are drawn out into long, narrow ends, slanting toward base of coxae III.

LEGS: Moderately stout; coxae III ventrally more finely punctured than in *peramoenus*.

ABDOMEN: Gastrocoeli and thyridia subobsolete; puncturation of tergites 1-3 distinctly finer than in *peramoenus*; the 3rd tergite with shallow and very fine puncturation, coriaceous between punctures; 4th tergite practically impunctate, finely coriaceous.

MALE: Length 9 mm. Head ivory, the following black (often variegated with orange): antennal cavities, middle of frons, ocellar and occipital regions; thorax orange, the following ivory: collare, pronotal ridge and base, subalarum, marks on tegulae, scutellum, postscutellum, 2 marks on propodeum (covering areae posteroexternae and their environment), prosternum, mesosternum, exterior belt of prepectus all around, lower part of mesopleura, coxae and trochanters I and II, and sometimes 2, faintly indicated, longitudinal lines on mesoscutum; all femora, tibiae, and tarsi, coxae and trochanters III, and the entire abdomen orange; the following black: prepectus predominantly, mark below subalarum, narrow exterior margin of mesoscutum, basal furrow of scutellum, axillary troughs,

usually the lower end of area posteromedia and the lower margin of areae coxales; tip of tibiae III blackish infuscated on dorsal side; flagellum black, ventrally pale (orange-tinged) brown, with white annulus on segments 11-17 (base); scape dorsally black, laterally orange, ventrally ivory.

FLAGELLUM: With 30 segments and with bacilliform tyloids on segments 4-12, the longest not reaching to bases and apices of segments, but being comparatively longer than in *carolinensis*.

HEAD: Temple profile distinctly narrowed behind eyes, only slightly curved; vertex and upper frons less convex than in *carolinensis*; head in dorsal view wider; malar space only about 1/3 as long as width of mandible base; cheeks in lateral view moderately wide, scarcely convex, slightly receding toward carina genalis.

THORAX: Mesoscutum moderately convex, somewhat longer than medially wide, moderately densely and moderately coarsely punctured, polished between punctures; notauli indicated only at base; scutellum distinctly raised above postscutellum and convex, apically truncate and fairly steeply curved down to postscutellum, laterally not carinate; area superomedia and areae dentiparae analogous to female, but comparatively somewhat shorter.

ABDOMEN: Median field of postpetiole prominent, not very densely punctured, polished between punctures; gastrocoeli shallow, but clearly indicated by longitudinal rugosity, the thyridia oblique, well recognizable though narrow.

DISTRIBUTION (map 95): Central Florida as follows: Highlands Co.: 2 females, Archbold Biological Station, 14-V-1967, G. Heinrich; 5 males, Highlands Hammock State Park, 20-IV-28-VI, G. Heinrich. All specimens in CGH II.

8. *Barichneumon carolinensis* Heinrich Map 96

Barichneumon carolinensis Heinrich, 1972: 199-200, female, male.

Holotype: male, North Carolina; CGH II. Allotype: female, Georgia; CGH II.

SYSTEMATICS: One of the smallest and most common species of this genus in the southeastern states.

Males share with the preceding species, *floridanus* Heinrich, the orange mesoscutum but not the white annulus of the flagellum; they are chromatically distinguished particularly by the consistently white-marked prescutellar carinae.



Map 95. *Barichneumon floridanus* Heinrich

Females are readily identifiable by the combination of the following characters: (1) flagellum exactly filiform, short and stout, apically blunt, slightly tapering toward base; (2) areae dentiparae abbreviated, the carina dentipara exterior, as a rule, shorter than the exterior carina of area superoexterna; (3) scutellum laterally not carinate, except on the extreme base.

FEMALE: Length 5-6 mm. Orange ferruginous, with very restricted ivory markings; ivory are only: a more or less distinct, short and narrow band on vertical orbits, collar, extreme end of pronotal ridge, and a mark on subalarum; sometimes scutellum apically and/or apico-laterally ivory tinged; coxae and trochanters I and II orange-tinged ivory; the following black: central part of prepectus, small mark below subalarum, exterior margin of mesoscutum very narrowly, basal furrow of scutellum, axillary troughs; flagellum black, with dorsal white annulus on segments 6 or 7 to 11 or 12 or 13, brownish toward base; scape ferruginous, on dorsal side blackish toward apex.

FLAGELLUM: Filiform, short, apically thick and blunted, slightly narrowed toward base, with 24 segments, the 1st about 1.3 times as long as apically wide, in lateral view the 5th square, the widest on the flat side about 1.3 times as wide as long.

HEAD: Temple profile slightly narrowed behind eyes, distinctly curved; cheek profile

in frontal view distinctly curved toward mandibles, the outline of head approaching a circular shape; malar space fully as long as width of mandible base; face receding from upper margin toward end of clypeus, the median field, lateral fields, and clypeus each slightly protruding, the latter with indication of a transverse, narrow depression before apical margin; frons convex, moderately densely punctured.

THORAX: Notauli indicated only at the base, sternaui distinct; scutellum flat, laterally carinate at the extreme base only; propodeum short, the area posteromedia slightly longer than horizontal part medially; area superomedia hexagonal, strongly narrowed toward area basalis, with costulae far beyond middle; areae dentiparae abbreviated, the carinae dentiparae exteriores distinctly shorter than exterior carinae of areae superoexternae.

LEGS: Short, the femora III in lateral view little more than 3 times as long as medially wide.

ABDOMEN: Gastrocoeli and thyridia very small but recognizable; tergites 1-3 coarsely and fairly densely punctured, the 4th tergite somewhat less coarsely punctured to about middle.

MALE: Length 6-8 mm. Head ivory, antennal cavities, broad middle of frons, ocellar and occipital regions black, usually more or less extensively variegated with orange; thorax ventrally ivory, the mesoscutum orange ferruginous; the following ivory: collar, pronotal ridge and base, subalarum, tegulae, marks on prescutellar carinae, scutellum, postscutellum, carinal triangle, and declivity of propodeum (except usually orange area posteromedia); color of pleura varying from predominantly ivory (propleura and metapleura faintly orange tinged) to predominantly orange; the following black: usually short, median band or mark on pronotum, exterior margin of mesoscutum narrowly, base of prosternum, prepectus more or less extensively (except exterior belt), basal furrow of scutellum, axillary troughs, basal furrow of propodeum medially, mark below subalarum; legs orange ferruginous, the following ivory: entire coxae and trochanters I and II and coxae III dorsally on interior side and ventrally on interior side; tarsi III slightly, rarely distinctly infuscated; abdomen usually uniformly orange ferruginous, rarely anterior tergites apically ivory tinged; flagellum black, ventrally ochreous, without annulus; scape orange, ventrally whitish, dorsally blackish infuscated.

FLAGELLUM: With 28-29 segments and with small, bacilliform tyloids on segments 4-14 or 15, the longest (on segments 5-10) covering only about median 1/3 of segments.

HEAD: Temple profile barely narrowed behind eyes, with distinctly curved outline; cheeks in lateral view wide and moderately convex; malar space about 1/3 as long as width of mandible base; outline of head in front view approaching a circular shape.

THORAX: Notauli indicated only at the extreme base; mesoscutum moderately densely and coarsely punctured, polished between punctures; scutellum barely raised above postscutellum, rather flat, with a few scattered punctures, polished, apically truncate, medially wider than long, with sharp lateral edges to about middle; area superomedia medially about as wide as long or slightly wider, with costulae beyond middle, narrowed from costulae toward area basalis, approximately hexagonal; mesopleura fairly densely, moderately coarsely punctured, without rugae, with fairly large, convex, smooth speculum.

DISTRIBUTION (map 96): North Carolina, south to southern Florida and west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 6 females, 4 males, Ouachita State Park, 8-29-V-1972, G. Heinrich. D. Shaneck. FLORIDA. Alachua Co.: 1 female, Gainesville, 3-V-1968, G. Heinrich. Clay Co.: 2 males, Gold Head Branch State Park, 25-

IV-2-V-1971, G. Heinrich. Highlands Co.: 1 male, Archbold Biological Station, 10-IV-1968, G. Heinrich. Hillsborough Co.: 1 female, Hillsborough River State Park, 7-IV-1970, G. Heinrich. Lee Co.: 1 female, 1 male, Ft. Myers, 13-17-IV-1968, G. Heinrich. GEORGIA. Clarke Co.: 1 specimen, Athens, 11-15-V-1970, R. Duffield. Monroe Co.: 3 males, Forsyth, 20-IV-24-VI-1971, 23-30-IX-1970, F. Naumann. LOUISIANA. Avoyelles Co.: 4 males, Eola, 24-IV-9-V-1972, D. Shaneck. Evangeline Co.: 2 females, 5 males, Bayous Chicot, 15-29-III-1972, 11-VIII-29-IX-1971, D. Shaneck; 3 males, Chicot State Park, 6-14-VIII-1971, D. Shaneck. Natchitoches Co.: 2 males, Powhatan, 11-13-VI-1971, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 1 female, 1 male, Starkville, 1-V-15-VIII-1970-1971, C. Sartor. Yalobusha Co.: 10 females, 46 males, Water Valley, 7-IV-6-V and 9-VIII-9-X-1971, M. Horan. NORTH CAROLINA. Wake Co.: 1 male, Raleigh, 8-V-1970, G. Heinrich. TENNESSEE. Henderson Co.: 2 females, 2 males, Natchez Trail State Park, 1-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

9. *Barichneumon fuscusignatus* Heinrich Fig. 47-48, Map 97

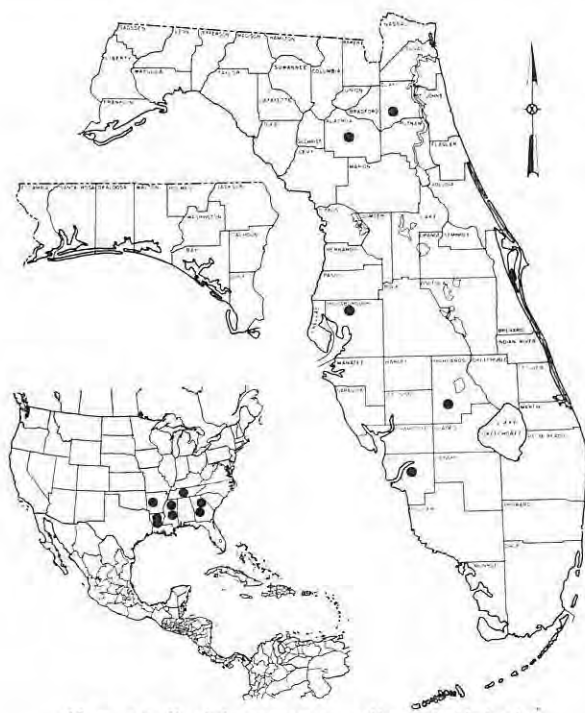
Barichneumon fuscusignatus Heinrich, 1972:197-198, female, male.

Holotype: male, Florida; CGH II. Allotype: female, Florida; CGH II.

SYSTEMATICS: In both sexes of this species the scutellum is laterally distinctly carinate for the entire length, a character shared only by *peramoenus* and approached by *neosorex*. However, in *fuscusignatus* the lateral carinae are more extensive and more distinct than in *neosorex*, and the scutellum is less completely depressed and flattened than in *peramoenus*.

Females are closely related and very similar to *peramoenus*; they can be distinguished in direct comparison by (1) the temple profile (cf. fig. 44, 47) slightly less narrowed behind eyes; (2) slightly more elongate basal segments of flagellum; (3) more pronounced and more extended lateral carinae of scutellum. Chromatically they differ from *peramoenus* only by the complete absence of ivory on vertical orbits.

Males are chromatically rather similar to *peramoenus*, particularly in the congruent ivory pattern of the black mesoscutum; they differ from *peramoenus* decisively by the



Map 96. *Barichneumon carolinensis* Heinrich

complete absence of the white flagellar annulus and by the uniformly ivory mesopleura. Rather distinctive for the male of this species is the basic color of the entire body, it is markedly paler than in most other southeastern species, partially ivory-tinged orange on abdomen and legs, ivory on sterna, pleura, and propodeum; the postpetiole bears always a large black mark (except an apical, ivory band); usually also the 2nd tergite black marked (in rare variations most tergites may display black marks).

FEMALE: Length 8 mm. Almost uniformly pale orange ferruginous, with only collare ivory; faintly ivory tinged are: apex of pronotal ridge, apex of scutellum, coxae and trochanters I and II; sterna a shade paler than dorsal side of thorax; the following are black or blackish: small mark below subalarum, axillary troughs, usually very narrowly the exterior margins of mesoscutum, sometimes a mark on the base of prepectus; flagellum black, with dorsal white annulus on segments 6 or 7 to 12 or 13, the segments before annulus on dorsal side at least apically, on ventral side predominantly, brown; scape orange.

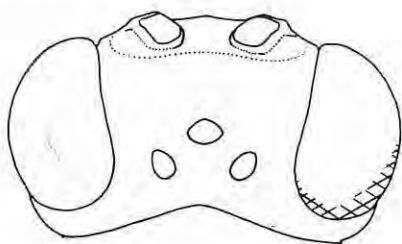


Fig. 47. *Barichneumon fuscognatus* Heinrich (female). Head, dorsal view.

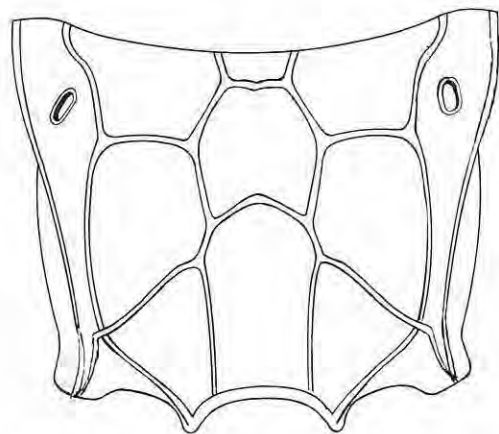


Fig. 48. *Barichneumon fuscognatus* Heinrich (female). Propodeum, dorsal view.

FLAGELLUM: Filiform, fairly slender, slightly tapering toward apex, ventrally flattened beyond middle but barely widened, with 26-27 segments, the 1st slightly more than twice as long as apically wide, in lateral view the 6th or 7th square.

HEAD: Temple profile fairly strongly narrowed behind eyes, nearly straight (fig. 47); cheek profile moderately narrowed toward mandible base, slightly curved; malar space distinctly longer than width of mandible base; face distinctly receding from facial arch toward end of clypeus; clypeus convex; median field of face somewhat protruding; frons slightly convex, rather densely punctured, finely coriaceous between punctures.

THORAX: (cf. fig. 48, 45) Structure generally as in *peramoenus*, but horizontal part of propodeum medially tangibly shorter in comparison to the length of area postero-media and, consequently area superomedia comparatively shorter than in *peramoenus*; apices of areae dentiparae (fig. 48) somewhat longer drawn out than in *peramoenus* (though by far not as long as in *floridanus*), the carinae dentiparae interiores usually slightly curved forward beyond base (straight in *peramoenus*); lateral carinae of scutellum more prominent than in *peramoenus*.

LEGS: Moderately stout; coxae III ventrally densely punctured.

ABDOMEN: Postpetiole and tergites 2 and 3 coarsely and densely punctured, glossy between punctures, the 4th tergite practically impunctate, with only scattered, irregular, and shallow punctures on basal part; gastrocoeli and thyridia small but rather distinct.

MALE: Length 8 mm. Head ivory, the following black: antennal cavities, middle of frons, ocellar and occipital regions; malar space not black marked; thorax ventrally and laterally (including entire metapleura) ivory, dorsally predominantly black; mesoscutum always with 2 longitudinal, median ivory lines and 2 lateral ivory lines, and with ivory prescutellar carina and scutella (thus exactly repeating the pattern of *peramoenus* male); the following black: basic color of mesoscutum, a median, narrow band on pronotum, axillary troughs, basal furrow of propodeum, a narrow band below subalarum on mesopleura, the areae superoexternae, superomedia, basalis, and posteromedia, and usually the areae dentiparae basally; legs and abdomen pale orange; dorsal surface of postpetiole black, except apical ivory band;

often also the 2nd tergite with a (usually bipartite) black mark; exceptionally also the 3rd or even 3rd and 4th tergite black marked; femora III and tibiae III apically not, or very restrictedly, black or infuscated; the tarsi III black, in lesser extent also the tarsi II dorsally infuscated; all coxae and trochanters ivory, the coxae III usually black marked on exterior side; flagellum black, without annulus, ventrally pale ochreous; scape ventrally ivory.

FLAGELLUM: With 30 segments and with small elliptic tyloids on segments 7-14, the longest covering approximately the median 1/2 of the length of segments.

HEAD: Temple profile moderately narrowed behind eyes, curved; malar space nearly 1/2 as long as width of mandible base; upper mandible tooth considerably longer than the lower; median field of face slightly protruding.

THORAX: Mesoscutum coarsely and densely punctured, shiny between punctures; about anterior 1/5 of notauli distinct; scutellum slightly raised above postscutellum, laterally sharply carinate to beyond middle, with sparse, coarse puncturation; area superomedia longer than wide, parallel sided, approaching usually a rectangular shape; area posteromedia approximately parallel sided, as wide as area superomedia, irregularly, transversely rugose.

ABDOMEN: Postpetiole coarsely, densely, and regularly punctured all over, without distinct median field; gastrocoeli and thyridia fairly distinct, though small; tergites 2-4 coarsely and densely punctured, polished between punctures.

DISTRIBUTION (map 97): ARKANSAS. Garland Co.: 1 female, 1 male, Ouachita State Park, 16-21-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Clay Co.: 3 males, Gold Head Branch State Park, 3-4-V-1971, G. Heinrich. Highlands Co.: 2 males, Archbold Biological Station, 27-II-16-III-1968, G. Heinrich; 1 female, 2 males, Highlands Hammock State Park, VIII-1969-I-1970, R. Miller. Hillsborough Co.: 1 male, Hillsborough River State Park, 8-VI-1970, G. Heinrich. GEORGIA. Clarke Co.: 3 females, 6 males, Athens, 8-VII-21-IX-1970, L. Hermann. Monroe Co.: 1 female, 2 males, Forsyth, 23-31-VII-1970, 13-30-IX-1971, F. Naumann. LOUISIANA. Avoyelles Co.: 1 female, 4 males, Eola, 13-IV-22-VI-1972, D. Shaneck. Evangeline Co.: 1 male, Bayou Chicot, 3-VII-4-VIII-1971, D. Shaneck. Natchitoches Co.: 3 males, Powhatan, 11-18-VI-1971, G. Heinrich. Webster Co.: 2 females, 1 male, Bistineau State Park,

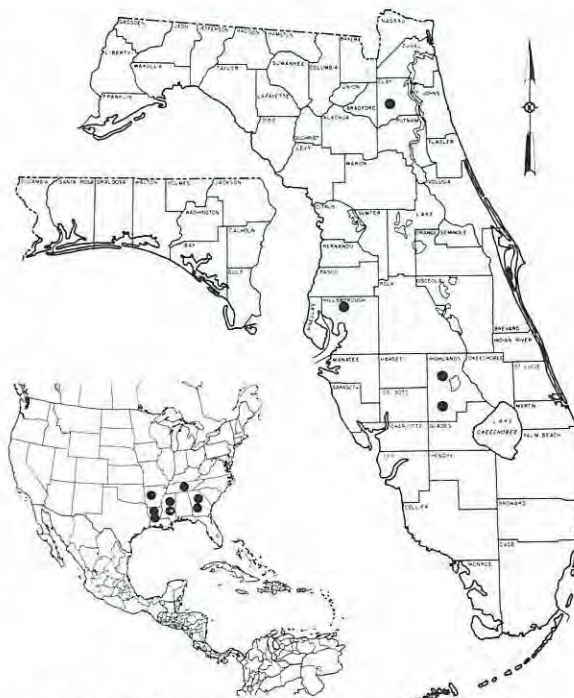
16-30-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 3 females, 4 males, Starkville, 27-IV-24-IX-1971, C. Sartor. Yalobusha Co.: 2 females, 6 males, Water Valley, 6-20-X-1970, 27-III-4-VI-1971, M. Horan. TENNESSEE. Henderson Co.: 2 females, 3 males, Natchez Trail State Park, 1-12-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

24. Genus *Stenobarichneumon* Heinrich

Stenobarichneumon Heinrich, 1962:633-640 (5 species from northeastern Nearctic region). Townes, et. al., 1965: 438-439 (2 species from eastern Palearctic region). Townes and Townes, 1966:262 (1 species from Chile).

Type species: *Ichneumon citator* Thunberg.

SYSTEMATICS: The relationship of this genus to the preceding, *Barichneumon* Thomson, is close and analogous to that of *Homotherus* Forster to *Cratichneumon* Thomson, or of *Stenichneumon* Thomson to *Ichneumon* Linnaeus. In each of these 3 cases the only decisive difference between the 2 related genera is represented by the structure of gastrocoeli and/or thyridia, which are widened, with narrowed interspace in *Stenobarichneumon*, *Homotherus*, and *Stenichneumon*; *Stenobarichneumon* shares with *Barichneumon* particularly the neatly punctured postpetiole and anterior



Map 97. *Barichneumon fuscignatus* Heinrich

also the flagellum of females (bristle shaped, slender, and fairly long, in contrast to *Barichneumon*); the other group, represented by the Nearctic species *agitor* Heinrich and also by the southeastern species described below, has the wide and fairly deep gastrocoeli and wide thyridia with the interspace distinctly narrower than 1 of them, as the only structural character differentiating these species from *Barichneumon*.

All known Nearctic species of the *agitor* group have black basic color of head and thorax with very restricted white pattern, usually including white marks on vertical orbits; the abdomen is entirely or partially red.

DISTRIBUTION: Holarctic Region and Chile.

**1. *Stenobarichneumon agitorops*,
new species
Map 98**

SYSTEMATICS: A species of the *agitor* group, with females chromatically rather similar to *agitor* Heinrich, but distinguished in structure by: (1) the temple profile, more strongly narrowed behind eyes; (2) slightly more slender and comparatively slightly more elongate basal segments of flagellum; (3) distinctly more slender femora I and II. Females share with *agitor* the black basic color of head and thorax and the ivory mark on vertical orbits; they differ constantly by apically white scutellum and by uniformly ferruginous legs, including all coxae and trochanters, only tip of tibiae III and sometimes of femora III narrowly infuscated.

The associated males are chromatically quite different from *agitor*, particularly by the uniformly or almost uniformly ivory face and clypeus and by the ivory coxae I and II, trochanters I and II, and apex to most of scutellum.

FEMALE: Length 7 mm. Head and thorax black, with apically or entirely ferruginous clypeus and with the following ivory parts: marks on vertical orbits, small marks on upper facial orbits, usually narrow line on apex of pronotal ridge, mark on collare, mark on subalarum, mark on tegulae, and apex of scutellum; legs almost uniformly ferruginous, including coxae; the extreme tip of tibiae III and sometimes also of femora III blackish infuscated; coxae and trochanters I and II usually faintly ivory marked apically on dorsal side; abdomen uniformly ferruginous, the 7th tergite with ill-defined, apical, ivory mark; flagellum black, with dorsal white annulus on segments 5 (apex) or 6 to 11 or 12; scape uniformly orange.

FLAGELLUM: Subfiliform, with 27-28 segments, not widened beyond middle, slightly attenuated toward apex; the 1st segment fully twice as long as apically wide, in lateral view the 6th square; on the flat side none wider than long.

HEAD: Temple profile markedly narrowed behind eyes, nearly straight; cheek profile markedly narrowed toward mandible base, straight; malar space about as long as width of mandible base; median field of face slightly protruding; clypeus somewhat convex, with depressed apical border; face and frons neatly and densely punctured.

THORAX: Mesoscutum slightly convex, not very densely punctured, polished between punctures; notauli only basally indicated; scutellum moderately convex and slightly raised above postscutellum, polished, with sparse punctures, laterally carinate at base; propodeum with complete and distinct carination, the area posteromedia distinctly longer than the horizontal part medially; area superomedia usually slightly longer than apically wide, with costulae in or behind middle, strongly narrowed from costulae toward area basalis, and nearly smooth; spiracles of propodeum rather short, about 2-3 times as long as medially wide; mesopleura fairly densely punctured, including most of speculum.

LEGS: Moderately stout; ventral side of coxae III and the femora III rather densely punctured.

ABDOMEN: Postpetiole with distinct median field, coarsely and rather densely punctured, as are also tergites 2 and 3; the 4th tergite less coarsely and less densely punctured; gastrocoeli distinct, moderately deep, each slightly wider than their interspace; thyridia distinct.

MALE: Length 7-8 mm. Head and thorax black, the following ivory: mandibles except teeth, face and clypeus uniformly or almost uniformly, marks on vertical orbits, sometimes band on outer orbits below temple region, collare, pronotal ridge and base, subalarum, tegulae, scutellum apically to nearly entirely (always except at least the basal, median part black), postscutellum; legs orange, the coxae and trochanters I and II uniformly white, apices of femora III and of tibiae III, and the tarsi III black; apices of femora I and II, dorsal side of tibiae and tarsi I and II, 1st trochanters III dorsally, and usually apices of coxae III ivory tinged; abdomen orange, base of petiole blackish, 7th tergite toward apex ivory tinged; flagellum black without annulus, ventrally brown; scape black, orange on inner side, ventrally ivory.

FLAGELLUM: With 28-29 segments and with longish-oval, narrow tyloids on segments 4-12, the longest not reaching to bases and apices of segments.

HEAD: Temple profile fairly strongly narrowed behind eyes, with curved outline; malar space about 1/3 as long as width of mandible base; frons finely but distinctly and densely punctured.

THORAX: Mesoscutum distinctly longer than medially wide, fairly strongly convex, densely punctured, glossy between punctures; anterior 1/3 of notauli distinct; scutellum somewhat raised above post-scutellum, apically truncate, gradually curved down toward postscutellum, carinate laterally at base; carination of propodeum as in female.

ABDOMEN: Tergites 1-5 densely and fairly coarsely punctured, the 6th tergite less coarsely and less distinctly punctured; gastrocoeli wider than their interspace, longitudinally rugose, the thyridia fairly large and slightly oblique, each wider than the interspace.

Holotype: female, Arkansas, Garland Co., Ouachita State Park, 15-18-V-1972, G. Heinrich, D. Shaneck. Allotype: male, same data except 12-17-V-1972. Paratypes: 3 females, 4 males, same locality, 11-29-V-1972. All specimens in CGH II.

DISTRIBUTION (map 98): ARKANSAS. In addition to the types, 5 males, same data as holotype, except 9-29 V-1972. GEORGIA. Clarke Co.: 1 male, Athens, 1-6-V-1969, G. Heinrich. Monroe Co.: 1 male, Forsyth, 10-17-VI-1971, G. Heinrich. MISSISSIPPI. Yalobusha Co.: 2 males, 11-V-12-VI-1971, M. Horan. TENNESSEE. 1 male, Natchez Trail State Park, 1-6-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

25. Genus *Vulgichneumon* Heinrich

Fig. 49-52

Melanichneumon (*Vulgichneumon*) Heinrich, 1961:17 (key); Heinrich, 1962:604-619, 667 (fig. 27-30).

Type species: *Ichneumon brevicinctor* Say; original designation.

Vulgichneumon, Townes, et al., 1965:432, 595 (8 species from the eastern Palearctic Zone). Heinrich, 1967:615-616 (3 species from Africa and Madagascar).

SYSTEMATICS: When this genus was originally introduced and separated from *Barichneumon* Thomson and *Melanichneumon* Thomson, a rather large number of species was included in it; these species, however, were not homogenous in structure and a renewed examination of the entire,



Map 98. *Stenobarichneumon agitatorops*, n. sp. pertinent Holarctic fauna convinced me that a further generic division of the group was advisable and feasible. The generic name *Vulgichneumon* will be applied in this publication to a few species of the Nearctic fauna only, and to another, larger set of species of the Palearctic fauna. All these species are distinguished by a character which is rare and unusual within the subfamily Ichneumoninae: marked sexual dimorphism of the structure of gastrocoeli and thyridia. In females, the gastrocoeli are, as is the rule, located at the extreme base of the 2nd tergite, they are superficial and small, and they are combined, also as is the rule, with equally-sized thyridia (fig. 51). In the associated males (fig. 52) the gastrocoeli are more or less, sometimes (as in the type species) considerably, elongate along the lateral border of the base of 2nd tergite;

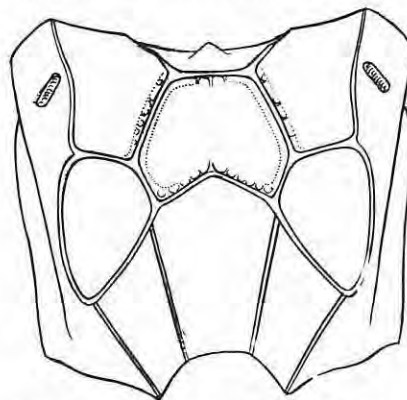


Fig. 49. *Vulgichneumon brevicinctor* Say (female). Propodeum, dorsal view.

consequently the thyridia are so far removed from the base of the tergite, that the distance of the interior end of the thyridium from the base of the 2nd tergite is at least longer than 1/2 the width of the thyridium, sometimes even longer than its entire width.

The genus *Vulgichneumon* is closely related to *Barichneumon*, differing from it decisively only by the structure of gastrocoeli and thyridia, as described above. The tropical counterpart of *Vulgichneumon* is the genus *Crytea* Cameron (in the Ethiopian and Oriental Regions), distinguished only by the laterally distinctly carinate scutellum.

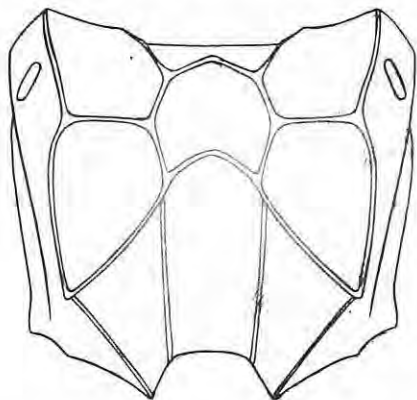


Fig. 50. *Vulgichneumon brevicinctor* Say (male). Propodeum, dorsal view.

So far only 2 Nearctic species are known which fit into the genus *Vulgichneumon* sensu stricto: the type species, *brevicinctor* (Say) and *terminalis* (Cresson); both are recorded from the southeastern part of North America. A 3rd, extremely small, southeastern species (*phaeogenops* Heinrich) is tentatively also attributed below to this genus, although the structure of spiracles and of the head and flagellum of the female is quite different from all other species of the genus.

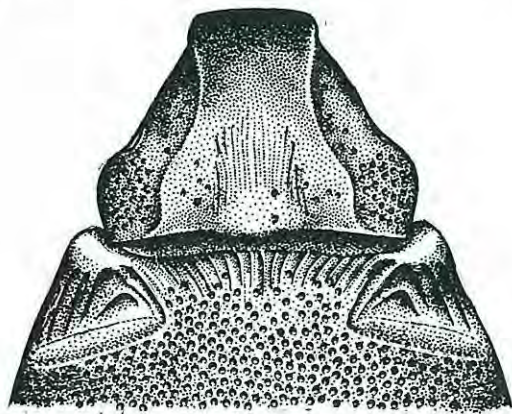


Fig. 51. *Vulgichneumon brevicinctor* Say (female). Abdominal tergites 1-2, dorsal view.

In the Palearctic Zone the genus is represented by a greater number of species, among them *bimaculatorius* (Panzer) (so closely related to the American *brevicinctor* that the 2 forms could be considered as associated subspecies), *saturatorius* (Linnaeus), and *lepidus* (Gravenhorst).

Additional differences between *Vulgichneumon* and *Barichneumon* are:

Vulgichneumon

- (1) Postpetiole (fig. 51) usually with distinct median field, which is sometimes nearly smooth, tending to be longitudinally striate or rugose, more rarely, punctured.
- (2) The inner, lower angle of discocubital cell acute.
- (3) Flagellum of female with comparatively longer 1st segment, usually more than twice as long as apically wide; on the average, flagellum longer and more slender.
- (4) Spiracles of propodeum more elongate, tending to be slit-shaped.

Barichneumon

- (1) Postpetiole with less distinct median field, which is never smooth or longitudinally rugose, or striate, but always neatly punctured.
- (2) The inner, lower angle of the discocubital cell tends to be a right one (by an inward curve of the basal nerve).
- (3) Flagellum of female with shorter 1st segment, usually less than twice as long as apically wide; on the average, flagellum shorter and stouter.
- (4) Spiracles of propodeum short and small, usually only 3-4 times as long as wide.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females moderately long and slender, usually (as in type species) filiform, the 1st segment fully 2-3 times as long as apically wide; of males with a row of distinct, longish-oval tyloids and with distinct, transverse, subapical bristle ridges on ventral side, thus slightly nodose, except basally.

HEAD: Structure, including mandibles, completely normal, as for example in the majority of species of the genus *Ichneumon* Linnaeus.

THORAX: Mesoscutum slightly longer than medially wide, moderately convex, fairly densely punctured; anterior 1/4 of notauli indicated; scutellum not, or slightly, convex in females, often more distinctly convex in males, laterally not carinate, except rarely, at the extreme base; propodeum of the clearly

broken type, horizontal part medially shorter than area posteromedia; basal furrow distinct; carination strong and usually complete, including costulae and carinae coxales; area basalis abbreviated; area superomedia, in type species, usually as wide as, or wider than long, hexagonal or almost horseshoe shaped, sometimes longer than wide (fig. 49, 50).

LEGS: Moderately stout; coxae III of females sometimes with scopa.

WINGS: Nervulus more or less distinctly postfurcal; areolet clearly pentagonal, though fairly strongly narrowed in front; radius straight, not abbreviated.

ABDOMEN: Postpetiole similar to that of the genus *Ichneumon*, with usually very clearly defined, always more or less distinct, usually striate, substriate, rugose, or almost smooth (more rarely punctured) median field, the lateral fields punctured; tergites 1-2 more or less densely punctured, almost never medially longitudinally rugose or striate; gastrocoeli subobsolete to fairly distinct, but always shallow, with sexually dimorphic thyridia, (fig. 51, 52) which in males are removed from base of 2nd tergite, as described in systematics.

CHROMATIC CHARACTERS: In the majority of species abdomen black or red, with apical white marks either in both sexes or at least in females, and without white markings on anterior tergites.

DISTRIBUTION: Holarctic and Ethiopian Regions.

HOSTS: Mainly Noctuidae. Recorded also are Arctiidae (Lithosiinae), Geometridae, and Pyralidae.

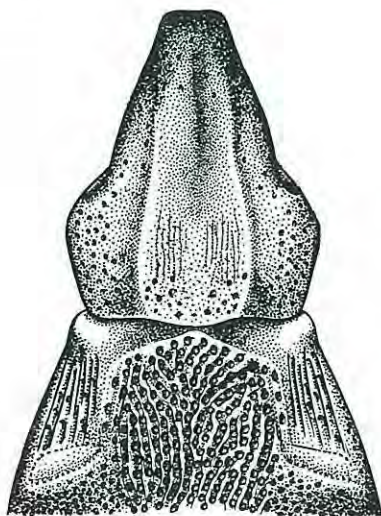


Fig. 52. *Vulgichneumon brevicinctor* Say (male). Abdominal tergites 1-2, dorsal view.

Key to species of *Vulgichneumon* of the southeastern states

Females and Males

1. Thorax black, except for white scutellum; abdomen black, except for white apical pattern; femora and tibiae III uniformly black; length 9-14 mm. 1. *brevicinctor* (Say)
- Basic color of thorax red or ferruginous; abdomen at least basally red or ferruginous; femora and tibiae III predominantly red or ferruginous; length 5-11 mm. 2
2. Head structure normal; frons, vertex, and occiput black; spiracles of propodeum about 4 times as long as wide; scutellum clear white; flagellum of males with white annulus; length 7-11 mm. ... 2 c. *terminalis carolinensis* Heinrich
- Head structure not normal; uppermost part of face strikingly protuberant, the face profile strongly receding toward mandibles; frons, vertex, and occiput ferruginous; spiracles of propodeum only slightly longer than wide; scutellum indistinctly ivory tinged in parts; flagellum of males without annulus; length 5-6 mm. 3. *phaeogenops* Heinrich

1. *Vulgichneumon brevicinctor* (Say)

Fig. 49-52, Map 99

Ichneumon brevicinctor Say, 1825:49, male.

Ichneumon extrematis Cresson, 1864:149, female.

Phygadeuon niger Provancher, 1874:280, female.

Melanichneumon brevicinctor, Townes and Townes, 1951:285, female, male.

Melanichneumon (Vulgichneumon) brevicinctor, Heinrich, 1962:606, female, male,

Holotypes: *Ichneumon brevicinctor*, male, locality not given; lost. *Ichneumon extrematis*, female; ANS. *Phygadeuon niger*, female, Canada; PMQ. Neotype: *Ichneumon brevicinctor*, male, Mt. Blue, Maine, 11-VII-1965; USNM (present designation).

SYSTEMATICS: The most common representative of this genus in the Nearctic Zone. Chromatically well distinguished in both sexes; the females by uniformly black color of the body, except consistently white first trochanters III, scutellum, and apical marks on tergites 6 and/or 7, the males by only one large apical white mark on the 7th tergite and the white scutellum, the first trochanters III

being usually black, as is the rest of the body. Flagellum in both sexes with white annulus. The extensively or entirely white color of first trochanters III of males in populations from central Florida, (Highlands Co.) may indicate a beginning of subspecific differentiation.

FEMALE: Length 10-12 mm. Black; only the following white: scutellum, as a rule a small, apical mark on the 6th tergite, always large mark on the 7th tergite, and the 1st trochanters III; flagellum with dorsal white annulus on segments 5 or 7 to 11 or 12; coxae III with thin scopa; length 10-12 mm.

FLAGELLUM: Filiform, fairly long and slender, ventrally flattened beyond middle but not widened, with 29 (usually) to 31 (rarely) segments, the 1st about 2.5 times as long as apically wide, in lateral view the 7th square.

HEAD: Temple profile slightly narrowed behind eyes, cheek profile distinctly narrowed toward mandible base, the former curved, the latter almost straight; malar space nearly as long as width of mandible base; cheeks in lateral view fairly strongly convex.

THORAX: Mesoscutum finely and very densely punctured, opaque; anterior 1/4 of notauli fairly distinct, sternaui indicated; scutellum scarcely raised above postscutellum; area superomedia usually as wide as, or wider, than long and slightly narrowed toward base, with costulae in or slightly behind middle, hexagonal or almost horse-shoe shaped (fig. 49).

LEGS: Moderately slender; coxae III with weak scopa, ventrally finely and densely punctured.

ABDOMEN (fig. 51): Median field of post-petiole clearly defined, fairly smooth, with some very fine longitudinal striation, and with a few scattered punctures; lateral fields densely punctured; gastrocoeli distinct though shallow and fairly small, with distinct thyridia; tergites 2 and 3 coarsely and densely punctured, subopaque.

MALE: Length 9-14 mm. Black; only the following white: scutellum and large apical mark on 7th tergite; 1st trochanters III usually black, in population from central Florida usually white; flagellum with dorsal white annulus on segments 13 or 14 to 17, 18, or 19; ventrally brownish tinged.

FLAGELLUM: With 31-34 segments and with bacilliform tyloids on segments 5 or 6 to 13, 14 or 15.

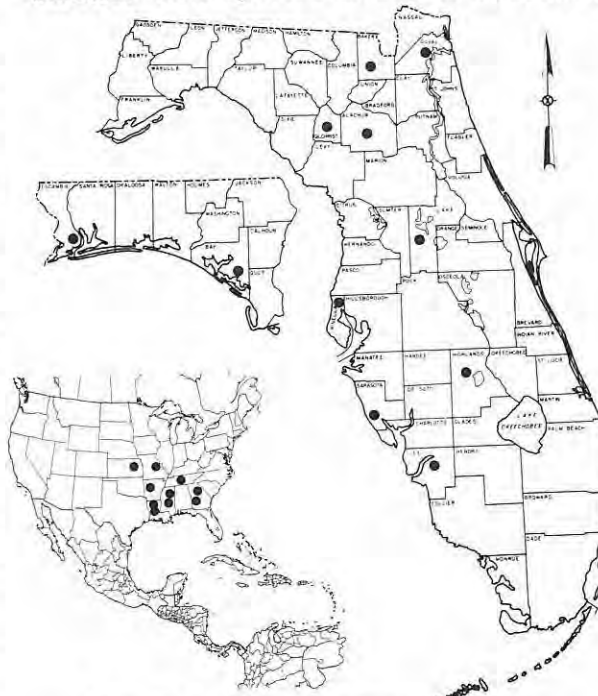
HEAD: Malar space scarcely 1/2 as long as width of mandible base.

THORAX: Mesoscutum slightly more convex than in female; scutellum markedly raised above postscutellum, convex; area superomedia (fig. 50) comparatively narrower and longer than in female, with approximately half-oval outline, and usually slightly longer than wide.

LEGS: Apex of femora I, the tibiae I, and usually the extreme tip of femora II, all on anterior side, ivorish; all spurs white or whitish; otherwise black, including (in contrast to female) in northern populations 1st trochanters III; in populations from Highlands Co. 1st trochanters III partially or entirely white (as in female), only in 1 out of 15 specimens black; in 5 specimens from Jacksonville 1st trochanters III black (as in northern populations), only in 1 specimen white.

ABDOMEN (fig. 52): Thyridia markedly more removed from base of 2nd tergite than in female, the gastrocoeli thus longer than wide, barely impressed.

DISTRIBUTION (map 99): According to Townes and Townes (1951), "transcontinental in Transition and Upper Austral Zone;" occurs in eastern North America from Ontario and Quebec south to southern



Map 99. *Vulgichneumon brevicinctus* Say

Florida and west to Louisiana, Arkansas, Missouri, and Kansas. ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 11-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: 1 male, Gainesville, 31-III. Baker Co.: 1 female, Sanderson, 1-I. Bay Co.: 1 female, Panama City, 14-XII. Duval Co.: 1 female, 5 males, Jacksonville, 18-XII. Escambia Co.: 1 male, Pensacola. Gilchrist Co.: 1 male, Blue Springs, 14-V-1967. Highlands Co.: 2 females, 15 males, Archbold Biological Station, 16-23-VI-1967, G. Heinrich. Lee Co.: 1 female, Fort Myers, 2-IV-1968, G. Heinrich. Pinellas Co.: 1 male, Tarpon Springs. Sarasota Co.: 1 male, Venice, 8-III (all specimens in FSCA). GEORGIA. Banks Co.: 1 male, Homer, 19-V-1970, G. Heinrich. Monroe Co.: 4 males, Forsyth, 1-8-X-1969, 20-22-V-1970, F. Naumann. KANSAS. Douglas Co.: Lawrence, 1 female, 1-X-1952, G. Heinrich. LOUISIANA. Avoyelles Co.: 1 male, Eola, 23-30-III, D. Shaneck. Evangeline Co.: 1 male, Bayou Chicot, 1-I-1972, D. Shaneck. Webster Co.: 1 male, Bistineau State Park, 30-IV-1972, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 1 female, Starkville, 7-7-14-V-1971, C. Sartor. Yalobusha Co.: 2 females, Water Valley, 3-VII-1970, 21-31-X-1970, M. Horan. MISSOURI. Marion Co.: Hannibal, 1 female, 15-IX-1952, G. Heinrich; Lexington, 15-IX-1952, G. Heinrich. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 5-10-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

HOSTS: *Callopistria floridensis* (Guen.) (Noctuidae: Amphipyridae); *Achatodes zaeae* (Harris) (Amphipyridae); *Macronoctua onusta* Grote (Noctuidae: Amphipyridae); *Pseudaletia unipuncta* (Haw.) (Noctuidae: Hadeninae); *Leucania latiuscula* (Herrich-Schaeffer) (Noctuidae: Hadeninae); *Lascoria ambigua* (Walker) (Noctuidae: Herminiinae); *Bleptina* sp. (Herminiinae); *Hyphantria cunea* (Drury) (Arctiidae); *Ostrinia nubilalis* (Hbn.) (Pyralidae); *Itame sulphurea* (Pack.) (Geometridae).

All of these hosts, except 2 species, are recorded for Florida (Kimball, 1965) and thus may serve as occasional hosts for the Florida population of this species. I suspect that at least in Florida *Callopistria floridensis*, the fern caterpillar, may be the typical and principal host (see next paragraph).

ECOLOGY: All 8 specimens collected in Florida were found in swampy hammocks, with dense, continuous carpet of ferns.

2. *Vulgichneumon terminalis* (Cresson)

SYSTEMATICS: A smaller species, closely related to *brevicinctor* (Say) in structure, but rather different in color; abdomen basally red, apically black, with apical white mark on the 7th tergite in both sexes; basic color of thorax varying geographically from uniformly black to uniformly red.

The range of the species has been divided (Heinrich, 1962) into 3 subspecies with Cresson's holotype from Delaware representing the geographically median form, replaced in the most northern part of the range by *terminalis apicalis* (Provancher), and in the most southern part by *terminalis carolinensis* Heinrich.

The 3 subspecies are to be distinguished as follows:

a. females

1. Thorax and femora III uniformly orange ferruginous, except for white scutellum and black basal furrow of scutellum and axillary troughs. 2 c. *terminalis carolinensis*
- Thorax and femora III partially or entirely black. 2
2. Thorax entirely black, except for white scutellum. 2 b. *terminalis apicalis*
- Thorax extensively ferruginous orange, at least propodeum and mesopleura so colored. 2 a. *terminalis terminalis*

b. males

1. Basic color of entire thorax orange ferruginous; 6th tergite with indistinct or subobsolete apical white band, its basic color predominantly or entirely orange; femora III only slightly infuscated at the extreme tip. 2 c. *terminalis carolinensis*
- Thorax extensively to entirely black; 6th tergite with conspicuous, apical, white band, its basic color entirely or extensively black; femora III apically broadly black. 2
2. Basic color of entire thorax and propodeum black. 2 b. *terminalis apicalis*
- Propodeum and mesopleura extensively or entirely ferruginous orange. 2 a. *terminalis terminalis*

2a. *Vulgichneumon terminalis terminalis* (Cresson)

Ichneumon terminalis Cresson, 1864:184, female.

Ichneumon finitimus Cresson, 1867:302, "female" = male.

Melanichneumon terminalis, Townes and Townes, 1951:286, female, male.

Melanichneumon (Vulgichneumon) terminalis terminalis, Heinrich, 1962:619, female, male.

Holotypes: *Ichneumon terminalis*, female, Delaware; ANS. *Ichneumon finitimus*, male, Illinois; ANS.

FEMALE: Length 7-8 mm. Head black, clypeus and mandibles black or ferruginous; thorax black, the propodeum and mesopleura predominantly or entirely ferruginous, scutellum white; legs ferruginous, apices of femora III and of tibiae III broadly black, tarsi III usually slightly infuscated; tergites 1-3, and the 4th tergite basally more or less extensively ferruginous; apical part of the 4th tergite and basic color of tergites 5-7 black, 7th tergite with apical white mark, the 6th usually with a small medio-apical mark or line; coxae and trochanters I and II, in specimens from the southern part of the range, sometimes extensively ivory; flagellum black, including scape, with dorsal white annulus; basal segments apically on dorsal side and ventrally more extensively brownish; scape and about 4 basal segments varying to completely orange in southern specimens.

FLAGELLUM: Filiform, slightly tapering toward base, but not at all toward apex, ventrally indistinctly flattened beyond middle but not widened, with 23-25 segments, the 1st about 2.5 times as long as apically wide, in lateral view the 7th approximately square.

HEAD: Temple profile slightly narrowed behind eyes, slightly curved; cheek profile distinctly narrowed toward mandibles, straight; cheeks in lateral view rather wide, but only slightly convex; malar space slightly longer than width of mandible base; cheeks and clypeus sparsely, face and frons densely punctured.

THORAX: Mesoscutum finely and very densely punctured, subopaque; notauli faintly indicated at base; area superomedia distinctly longer than wide, with costulae close to or slightly before middle, strongly narrowed from costulae toward area basalis, sometimes almost into a point; spiracles of

propodeum short, only about 4 times as long as medially wide.

LEGS: Coxae III ventrally densely punctured, without scopa.

ABDOMEN: Median field of postpetiole fairly distinct, extremely finely, longitudinally rugose, without puncturation, sometimes nearly smooth; gastrocoeli subobsolete, thyridia recognizable; tergites 2 and 3 finely and densely punctured.

MALE: Length 7-11 mm. Head black, clypeus, lateral fields of face, and mandibles white; thorax black, propodeum and mesopleura predominantly or entirely ferruginous; the following ivory: scutellum, postscutellum, mark on collare, apex of pronotal ridge, subalarum; legs ferruginous, apices of femora III and of tibiae III broadly black, the tarsi III blackish; coxae and trochanters I and II extensively ivory; distribution of ferruginous and black color on abdomen as in female; tergites 6 and 7 with large, apical white mark; flagellum always with complete white annulus.

FLAGELLUM: With 26-30 segments and with bacilliform, very short tyloids on segments 6 or 7 to 12 or 13, the longest covering only about the median third of the length of segments.

HEAD: Malar space about half as long as width of mandible base; cheeks in lateral view markedly narrower than in female.

THORAX: Horizontal part of propodeum considerably shorter than in female, medially only about half as long as area postero-media; area superomedia shaped as in female, but distinctly smaller and comparatively shorter.

ABDOMEN: Thyridia very far removed from base of 2nd tergite, their distance from the latter about 3 times as long as their width; tergites 2-4 and the base of the 5th tergite distinctly and densely punctured.

DISTRIBUTION: From southern Ontario, New York, Illinois, Iowa, south to Delaware, Maryland, and Missouri.

2b. *Vulgichneumon terminalis apicalis* (Provancher)

Mesostenus apicalis Provancher, 1875a:266, 267, male.

Phygadeuon brevicaudus Provancher, 1886: 54, female.

Melanichneumon terminalis, Townes and Townes, 1951:286, female, male.

Melanichneumon (Vulgichneumon) terminalis apicalis, Heinrich, 1962:619, female, male.

Holotypes: *Mesostenus apicalis*, male, Canada, and *Phygadeuon brevicaudus*, female, Canada; PMQ.

FEMALE: Head black, including clypeus; thorax black, scutellum white, rarely the mesopleuron or the propodeum with obscure ferruginous mark; legs ferruginous including coxae; coxae I usually partially black; femora III predominantly black, tibiae III apically black; tarsi III infuscated; tergites 1-3 ferruginous, 4-7 black, the 7th tergite with apical white mark, usually also the 6th tergite with small, apical, white spot.

MALE: Head black, except white clypeus only; thorax black, except for white scutellum, postscutellum, and mark on collare; legs ferruginous, including all coxae, the coxae I usually blackish infuscated in part; apices of femora III and of tibiae III, and the tarsi III more or less extensively black; tergites 1-3 ferruginous, basic color of tergites 4-7, and often apical band on the 3rd tergite, black; tergites 6 and 7 with apical white marks; flagellum with white annulus.

DISTRIBUTION: Quebec, Ontario, Michigan and Maine.

2c. *Vulgichneumon terminalis carolinensis* Heinrich
Map 100

Melanichneumon (Vulgichneumon) terminalis carolinensis Heinrich, 1962:619, female.

Holotype: female, North Carolina; CGH II. Neallotype: male, "Archbold Biological Station, Lake Placid, Florida, 22-VI-1967." CGH II (present designation).

FEMALE: Head black, clypeus and mandibles ferruginous; basic color of entire thorax orange, scutellum and sometimes mark on collare ivory; legs orange, apices of femora III and of tibiae III narrowly black or infuscated; trochanters I and II and sometimes also coxae I ivory, coxae II ivory-tinged orange; tergites 1-4 orange.

MALE: Head black, face, clypeus, and mandibles except teeth, uniformly ivory; basic color of entire thorax orange, the following ivory: collare, scutellum, apex of pronotal ridge, subalarum, and indistinctly, apex of prosternum; the following black: base of prepectus, basal furrow of scutellum, and axillary troughs; legs orange, apices of tibiae III, sometimes also of femora III narrowly infuscated; coxae and trochanters I and II ivory; tergites 1-4 and all or most of 5th

tergite orange, basic color of tergites 6 and 7, and sometimes apical 1/2 of the 5th tergite black; only the 7th tergite with apical white mark; flagellum with white annulus.

DISTRIBUTION (map 100): FLORIDA. Highlands Co.: 4 females, 2 males, Archbold Biological Station, 22-III-22-VI-1967, G. Heinrich. Leon Co.: 3 males, Tall Timbers Research Station, 1-17-V-1968, G. Heinrich. Liberty Co.: 1 female, Torreya State Park, 19-V-1970, H. Weems. LOUISIANA. Evangeline Co.: 2 males, Bayou Chicot, 12-20-X-1971, 1-IV-1972, D. Shaneck; 1 male, Chicot State Park, 15-22-III-1971, G. Heinrich. Webster Co.: 2 females, 1 male, Bistineau State Park, 17-IV-1972, G. Heinrich, D. Shaneck, MISSISSIPPI. Yalobusha Co.: 2 males, Water Valley, 15-IV-6-V-1971, M. Horan. NORTH CAROLINA. Wake Co.: Raleigh, 1 female, 10-VI-1951, G. Heinrich. TENNESSEE. Henderson Co.: 1 female, 1 male, Natchez Trail State Park, 1-9-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

3. *Vulgichneumon phaeogenops* Heinrich
Map 101

Vulgichneumon phaeogenops Heinrich, 1972:209, female, male.

Holotype: female, Florida; CGH II. Allotype: male, Florida; CGH II.

SYSTEMATICS: One of the smallest species of the subfamily, with very small,



Map 100. *Vulgichneumon terminalis carolinensis* Heinrich

only slightly longer than wide, spiracles of propodeum, suggesting a relationship to the tribe *Phaeogenini*. Particularly distinguished by the head structure of females. The uppermost part of the face bearing the antennal sockets is strongly protruding, the face, in lateral view, strongly receding from this culminating point toward the apical margin of clypeus; cheeks broad, convex, and slightly receding toward carina genalis. The flagellum of the female is short, filiform, blunt apically, and distinctly tapering toward the base.

The characters described above do not match the diagnosis of the genus *Vulgichneumon*. The species is tentatively attributed to this genus mainly on account of the structure of the sexually dimorphic gastrocoeli and the sculpture of the abdomen. It probably deserves generic distinction.

FEMALE: Length 5 mm. Light orange ferruginous, tergites 5-7 predominantly black, the 7th with apical white mark, sometimes also the 6th apically white; apices of femora III and of tibiae III slightly infuscated; flagellum ferruginous, with dorsal white annulus on segments 8 or 9 to 10; section beyond annulus blackish infuscated; scape ferruginous.

FLAGELLUM: Short, filiform, not at all attenuated toward apex, slightly tapering toward base, not distinctly flattened ventrally beyond middle, with 20 segments, the 1st nearly 1.5 times as long as apically wide, in lateral view about the 5th square, none wider than long, the last segment about twice as long as wide.

HEAD: Temple profile slightly narrowed behind eyes, with distinctly curved outline; frons slightly convex; cheeks, in lateral view, broad, convex, and somewhat receding toward carina genalis; malar space slightly longer than the width of mandible base; face of a peculiar structure: its uppermost part, bearing the antennal sockets, in lateral view strongly protruding, the face and clypeus, in lateral view, from this culminating point on strongly receding toward apical margin of clypeus; median field of face slightly protruding; cheeks glossy, with scattered, fine punctures.

THORAX: Mesoscutum convex, slightly longer than wide, finely and fairly densely punctured, extremely finely coriaceous between punctures, somewhat shiny; notauli weakly indicated at base, sternaui on the mesoscutum distinct; scutellum flat, sparsely punctured, shiny; propodeum with complete, though on the horizontal part not very

distinct (by dense, irregular rugosity), carination; area posteromedia slightly longer than horizontal part medially; area superomedia distinctly longer than wide, approximately hexagonal, with costulae near to middle, narrowed from costulae toward area basalis, the latter medially with a projecting tubercle; areae dentiparae fairly long; spiracles very small, short oval; pleura, including propleura, comparatively coarsely and very densely, speculum sparsely punctured.

LEGS: Fairly short and stout; femora III, in lateral view, about 3 times as long as medially wide; coxae II and III densely punctured, shiny, without scopa.

WINGS: Nervulus interstitial or slightly postfurcal; areolet pentagonal, comparatively wide, intercubiti widely separated in front; radius short and nearly straight.

ABDOMEN: Median field of postpetiole well indicated, distinctly longitudinally striate rugose; gastrocoeli obsolete, faintly indicated by some rugosity; thyridia indistinct, but faintly indicated; 2nd tergite densely and distinctly punctured all over, shiny; 3rd tergite slightly finer and less densely punctured to beyond middle.

MALE: Length 6 mm. The 5th tergite not, or restrictedly black; infuscations on apices of femora and tibiae III more extensive than in female, sometimes tibiae III dorsally infuscated close to their bases; tarsi III more or less extensively, sometimes entirely infuscated (except only extreme bases of segments); white are: face and clypeus, collare, subalarum and tegulae in part, all trochanters, coxae I and II, and apical mark on 7th tergite; scutellum laterally and apically indistinctly white tinged; flagellum dorsally blackish-brown infuscated, ventrally ferruginous or brownish, scape ventrally pale orange.

FLAGELLUM: With 25 or 26 segments, slightly nodose beyond middle by transverse bristle ridges on ventral side, without clearly recognizable tyloids.

HEAD: Malar space about 1/2 as long as width of mandible base; structure of face and clypeus corresponding with that of female, but less pronounced; outline of head in front view approaching a circular shape.

THORAX: Scutellum apically truncate and slightly raised above postscutellum; propodeum not (as usually) markedly abbreviated as compared to female; the carination as in female; sculpture of propleura and mesopleura less dense than in female and more shiny.

ABDOMEN: The longitudinal rugosity indicating the space of the gastrocoeli, narrow and elongate, removing the place of the (obsolete) thyridia fairly far from the base of 2nd tergite, a structure suggesting relationship of this species to the genus *Vulgichneumon*; median basal part of the 2nd tergite longitudinally rugose punctate.

DISTRIBUTION (map 101): North Carolina south to central Florida, west to Mississippi. **FLORIDA.** Highlands Co.: 1 female, 2 males, Archbold Biological Station, 20-III-1955, 22-VI-1967, 11-IV-1968, G. Heinrich, F. Mead. Liberty Co.: 1 female, Torreya State Park, 11-V-1968, G. Heinrich **NORTH CAROLINA.** Sampson Co.: Clinton, 1 female, 24-V-1951, H. and M. Townes. Elisabethtown, 2 males, 30-IV-1950, H. and M. Townes. All specimens in CGH II.

26. Genus *Virgichneumon*, new genus

Type species: *Ichneumon zebratus* Cresson, present designation.

SYSTEMATICS: The structure of the gastrocoeli and the thyridia represent the decisive character distinguishing this genus from the most closely related, *Vulgichneumon* Heinrich, and from *Barichneumon* Thomson (sensu stricto) as well as from *Rubicundiella* Heinrich. The gastrocoeli are, though not large, rather deeply impressed (with distinct thyridia), situated at the extreme base of 2nd tergite, and not at all sexually dimorphic; they are considerably

deeper and more pronounced than in all 3 genera mentioned above. The structure of the propodeum and its carination agrees with that of *Vulgichneumon*, and, together with the slender, bristle-shaped structure of flagellum of the female, separates this genus from *Melanichneumon* Thomson.

The type species is chromatically strikingly distinguished by the extremely rich yellow bandings on the abdomen. This chromatic character is shared, to a lesser degree, by the 2 Nearctic species *mimicus* (Cresson) n. comb. and *albomarginatus* (Cresson), n. comb., but is not at all typical for the entire group. Most of the Palearctic species display a completely black color of the abdomen (except the always present, white marks on apical tergites). The black Nearctic species *saevus* (Cresson) n. comb. and *subcyaneus* (Cresson) n. comb. are to be included in this genus, as are the 2 orange species, *excelsior* (Heinrich) n. comb. and *seticornutus* (Heinrich) n. comb. to be transferred to it from the genus *Barichneumon*.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females, in contrast to *Vulgichneumon*, bristle shaped, more or less strongly attenuated toward apex; of males usually with less prominent transverse bristle ridges on segments and consequently, as a rule, less distinctly nodose than in *Vulgichneumon*.

THORAX: Generally as in *Vulgichneumon*; the propodeum moderately abbreviated, the area posteromedia, as a rule, longer than the horizontal part medially; the scutellum tending to be slightly more raised above the postscutellum than in *Vulgichneumon*, particularly in males.

ABDOMEN: Gastrocoeli fairly deeply impressed, about triangular, situated at the extreme base of the 2nd tergite in both sexes, with pronounced thyridia; in contrast to *Vulgichneumon* sexually not dimorphic.

DISTRIBUTION: Holarctic Region.

HOSTS: Geometridae (in type species).

Key to the species of *Virgichneumon* Heinrich of the southeastern states

Females

1. Basic color of head, thorax, and abdomen orange ferruginous. (Orbits broadly ivory around eyes; 7th tergite with apical ivory mark; length 7-11 mm).
2. *seticornutus* Heinrich



Map 101. *Virgichneumon phaeogenops* Heinrich

- Basic color of head, thorax, and abdomen black. 2
- 2. Mesoscutum with rounded, median, yellow mark; face, clypeus, and orbits around eyes extensively yellow. (Tergites 1-5 with apical yellow bands, 6 and 7 with apical yellow marks; length 11-12 mm). 1. *zebratus* (Cresson)
- Mesoscutum without yellow mark; face, clypeus, and most of orbits black. .. 3
- 3. Tergites 1-4 with apical, white bands, 5-7 with apical white marks; propodeum white marked; coxae III with weak scopa; length 12-13 mm. 4. *albomarginatus* (Cresson)
- Abdomen uniformly black, in fresh specimens usually with a dark, metallic-blue hue; propodeum uniformly black; coxae III without trace of scopa; length 10-14 mm. 5. *subcyaneus* (Cresson)

NOTE: The females of *texanus* (Cresson) and *zebratus robsonicus* are unknown.

Males

- 1. Abdomen orange, only the 7th tergite with apical, ivory mark. (Basic color of tibiae III ferruginous; mesoscutum black; mesopleura and mesosternum black, partially ivory and ferruginous; length 9 mm). 2. *seticornutus* Heinrich
- Abdomen black, with or without yellow or ivory bands. 2
- 2. Abdomen uniformly black, in fresh specimens with a dark bluish hue; only the sides of face and clypeus white. (Mesoscutum and propodeum uniformly black; tibiae and tarsi extensively white; length 12-16 mm). 5. *subcyaneus* (Cresson)
- Abdomen black, with yellow or ivory bands and marks; face and clypeus uniformly white. 3
- 3. Mesopleura and metapleura extensively ivory. (Mesoscutum black, with a median yellow mark; all tergites with apical yellow bands or marks; length 12 mm). 4
- Mesopleura and metapleura uniformly, or almost uniformly black. (Femora III black). 5
- 4. Femora III orange, with black apex. Tibiae I and II orange, ventrally and apically yellow. 1 a. *zebratus zebratus* (Cresson)

- Femora III black, with white apex. Tibiae I and II ivory, with large, longitudinal, black band on dorsal side. 1 b. *zebratus robsonicus* new subspecies
- 5. All tergites with apical, ivory bands or marks; mesoscutum with median ivory mark; white around orbits not interrupted on temples. (Length 13-15 mm). 4. *albomarginatus* (Cresson)
- Only tergites 1-3 with apical ivory bands or marks, usually also the 7th tergite white marked; mesoscutum without median ivory mark; white band around orbits interrupted on temples. (Length 7-11 mm). 3. *texanus* (Cresson)

1a. *Virgichneumon zebratus zebratus* (Cresson), new combination Map 102

Ichneumon zebratus Cresson, 1867:299, female.

Melanichneumon zebratus, Townes and Townes, 1951:287, female.

Melanichneumon (*Vulgichneumon*) *zebratus*, Heinrich, 1962:616-617, female, male.

Holotype: female, Illinois; ANS. Neallotype: male, Maryland; CNC No. 7323.

SYSTEMATICS: A widely distributed, but rather rare species. Strikingly and uniquely distinguished in color in both sexes by the apical, bright yellow bands on tergites 1-5 (in addition to yellow marks on the last 2 tergites), and rich bright yellow markings on head and thorax, including a rounded, median mark on the mesoscutum. The distribution and shape of the yellow pattern is amazingly constant over the entire range of distribution of the species, only the color of femora III varies considerably geographically from bright orange with black apex in eastern North America to black with lemon yellow apex in British Columbia.

FEMALE: Length 11-12 mm. Head yellow, the following black: antennal cavities, middle of frons moderately narrowly, ocellar and occipital regions, and mark on malar space; thorax black, the following yellow: collare, pronotal ridge and base, subalarum, tegulae, large, rounded, median mark on mesoscutum, scutellum, postscutellum, carinal triangle, apical margin of area superomedia, about apical 1/2 of areae dentiparae and of areae spiraculiferae, the

areae posteroexternae, most of areae meta-pleurales (except basal part), a large mark on mesopleura (extending in front onto exterior margin of prepectus and below onto the mesosternum to sternauli, not covering the speculum and the uppermost part of mesopleura); legs orange, the following ivory: all trochanters, coxae I and II predominantly to entirely, coxae III on dorsal side, except basally, and ventrally at apex, tibiae I and II on anterior side, ill-defined mark on exterior side beyond base of tibiae III, and femora I and II on anterior side toward apex; coxae III black on anterior and interior side (except apically); abdomen black, the following yellow: regular, broad, apical bands on tergites 1-6, reaching to lateral margins on tergites 1-4, but laterally abbreviated slightly on the 5th tergite, strongly on the 6th, and a large, apical mark on the 7th tergite; flagellum black, with dorsal white annulus on segments 7-14 or 15, basal segments apically brownish; scape ventrally yellow.

FLAGELLUM: Bristle shaped, rather slender, ventrally flattened and slightly widened beyond middle, considerably attenuated toward apex, with 40-41 segments, the 1st about 3 times as long as apically wide, the 14th approximately square, the widest, on the flat side, not quite twice as wide as long.

HEAD: Temple profile and cheek profile moderately narrowed behind eyes and toward mandible base respectively, with somewhat curved outlines; malar space about 1/2 as long as width of mandible base; cheeks in lateral view rather wide, convex, sparsely punctured.

LEGS: Coxae III ventrally coarsely and densely punctured, with distinct scopa.

WINGS: Areolet pentagonal, though strongly narrowed in front; nervulus considerably postfurcal; radius straight.

ABDOMEN: Postpetiole with indicated median field, which is very finely coriaceous rugose, basally coarsely and densely (as are the lateral fields) punctured, apically coarsely and sparsely punctured; gastrocoeli triangular, deeply impressed, with conspicuous thyridia, considerably narrower than their interspace; anterior tergites rather strongly sclerotized, tergites 2 and 3 coarsely and densely punctured, without striation, extremely finely coriaceous between punctures.

MALE: Length 12 mm. Color pattern generally as in female, except for the following differences: the femora III (in eastern North America) orange as in female, but black apically; tibiae III ivory, apically

broadly black; femora I and II and tibiae I and II ivory, the femora I and II dorsally blackish infuscated, the tibiae I and II on ventral side infuscated or black; all metatarsi ivory tinged toward base, the tarsi III blackish; coxae III black and yellow, without ferruginous parts; flagellum black, ventrally brown, without annulus; scape ventrally yellow; apical 1/2 of prosternum ivory.

FLAGELLUM: With 39-41 segments and with bacilliform, very small and short tyloids on segments 7-14 or 15, only slightly nodose, though with well recognizable, subapical bristle ridges on ventral side.

DISTRIBUTION (map 102): From Michigan and Virginia, south to Arkansas, Louisiana, and southern Florida. ARKANSAS. Garland Co.: 1 female, 1 male, Ouachita State Park, 10-28-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Lee Co.: 2 males, Ft. Myers, 9-VII-1967, 26-IV-1971, D. Radtke. GEORGIA. Clarke Co.: 2 males, Athens, 7-VIII-1969, L. Hermann, Monroe Co.: 1 female, Forsyth, 20-IV-5-V-1971, G. Heinrich. LOUISIANA. Natchitoches Co.: 1 male, Powhatan, 11-VI-1971, G. Heinrich.

HOSTS: *Prochoerodes forficaria* (Gn.) (Geometridae). (Townes and Townes, 1951). *Lambdina forvidaria athasaria* (Wlk.) R. W. C. det. specimen from Virginia.



Map 102. *Virgichneumon zebratus zebratus* Cresson

**1b. *Virgichneumon zebratus*
robsonicus, new subspecies**

SYSTEMATICS: This subspecies differs from the nominate form only in the color of femora and tarsi III.

MALE: Femora III predominantly deep black, apically yellow; tarsi III predominantly ivory.

Holotype: male, British Columbia, Robson. In collection CGH II.

**2. *Virgichneumon seticornutus*
Heinrich, new combination
Map 103**

Barichneumon seticornutus Heinrich, 1971: 1011-1013, female, male.

Holotype: female, Georgia; CGH II. Allotype: male, Georgia; CGH II.

SYSTEMATICS: The female shares with the more northern species, *excelsior* Heinrich, the long and slender, bristle-shaped type of flagellum, but the flagellum of *seticornutus* is still more slender and more elongate. Differs clearly as a species from *excelsior* by the following characters: (1) femora II and III distinctly more slender; (2) temple profile distinctly more narrowed behind eyes (straight); (3) flagellum more slender and longer, not widened beyond middle, with more elongate basal segments (particularly the 2nd); (4) orbits broadly ivory all around eyes; (5) mesosternum, propleura, and propodeum not black but ferruginous. Females share with *excelsior* the apical white mark on the 7th tergite.

Males differ chromatically from females by the black basic color of head, thorax, and coxae III, a melanism parallel to the closely related species *excelsior*; they are in structure distinguished by an abbreviated propodeum, with transverse area superomedia corresponding (under consideration of the normal sexual dimorphism) with the female. Males share the white apical mark on the 7th tergite with the females. There is but little doubt that the association of the sexes is correct.

The female from Arkansas differs from the specimens from Georgia and Louisiana by basally extensively brown (instead of deep black) flagellum, by nearly uniformly orange coxae and trochanters I and II, and by uniformly orange tibiae and tarsi III; furthermore, the propodeum is uniformly orange, without ivory tinge on areae posteroexternae. The specimen may represent a distinct subspecies.

FEMALE: Length 7-11 mm. Orange ferruginous, with very restricted, black

markings on head and thorax; the following ivory: orbits broadly all around eyes, mandible base, collare, pronotal ridge and base, subalarum, mark on tegulae, scutellum, postscutellum, coxae I and II predominantly or apically only, 1st trochanters I and II usually apically, and apical mark on 7th tergite; areae posteroexternae sometimes ivory tinged; the following are black: antennal cavities, always ocellar region, sometimes also occipital region, base of prosternum, usually middle of pronotum (behind collare), and base of prepectus, always basal furrow of scutellum, axillary troughs, basal furrow of propodeum, sometimes the tarsi III from apex of metatarsus on; extreme apex of femora III and of tibiae III usually infuscated; flagellum black, with dorsal white annulus on segments 6-13 or 14, or base of 15; basal segments sometimes (specimen from Arkansas) extensively brownish; scape ventrally orange.

FLAGELLUM: Clearly bristle shaped, long and slender, strongly attenuated toward apex, with 31-37 segments; basal segments elongate, the 1st about 3.5 to 4 times, the 2nd 3 to 3.5 times as long as apically wide; in lateral view about the 13th square, the widest segment on the flat side barely wider than long.

HEAD: Temple profile in front view considerably narrowed toward mandible base, straight; malar space as long, or slightly longer than width of mandible base; median field of face only slightly protruding.

THORAX: Mesoscutum distinctly longer than wide, convex, fairly densely punctured, polished between punctures; about anterior 1/5 of notauli recognizable; scutellum slightly raised above postscutellum, dorsally nearly flat; propodeum markedly abbreviated, the horizontal part medially much shorter than area posteromedia; carination distinct and complete; area superomedia about as long as apically wide, with costulae nearly in the middle, narrowed from costulae toward the (very short) area basalis and in front sometimes rounded, forming a Roman arch.

LEGS: Fairly long, moderately slender; coxae III ventrally densely punctured, without scopa.

ABDOMEN: Postpetiole neatly punctured, with fairly distinct median field; tergites 2 and 3 densely and coarsely punctured, the 4th tergite on basal 1/2 with only shallow, indistinct puncturation; gastrocoeli and thyridia distinct, nearly as wide as their

interspace; 2nd tergite apically wider than medially long.

MALE: Length 9 mm. Head and thorax black, with rich ivory markings and with some irregular orange areas on the pleura; the following ivory: head, including mandibles (except black antennal cavities, middle of frons, ocellar and occipital regions), about apical 1/2 of prosternum, collar, pronotal ridge and base, exterior belt of prepectus, anterior outer region of mesosternum together with anterior lower part of mesopleura, markings on posterior, lower part of mesopleura, subalarum, tegulae, scutellum, postscutellum, areae postero-externae together with apical 1/2 of areae dentiparae and with apical parts of areae spiraculiferae, entire coxae and trochanters I and II, interior side of coxae III and their dorsal side basally, apico-lateral marks on postpetiole, and an apical mark on the 7th tergite; rest of abdomen orange ferruginous, the apical margin of the 2nd tergite ivory tinged; femora, tibiae, and tarsi I and II pale orange; trochanters III and base of femora III orange ferruginous, the femora III extensively blackish infuscated toward the apex, the trochanters III infuscated on exterior side; tibiae III basally ferruginous, shading into blackish toward middle; tarsi III blackish; flagellum black, ventrally pale brown, without annulus; scape ventrally ivory.

FLAGELLUM: With 32 segments and with elongate-oval tyloids on segments 6-17, the longest covering about median 1/2 of length of segments.

HEAD: Temple profile slightly narrowed behind eyes, with curved outline; malar space barely 1/3 as long as width of mandible base; median field of face scarcely protruding; face densely and very finely punctured; narrow belt of frons between ocellar region and antennal cavity coriaceous, with extremely fine and shallow, indistinct punctures.

THORAX: Mesoscutum longer than wide, fairly strongly convex, very densely and finely punctured, coriaceous between punctures, nearly opaque; anterior 1/4 of notauli rather distinct; scutellum moderately raised above postscutellum, gradually slanting toward the latter; propodeum strongly abbreviated, area posteromedia fully twice as long as horizontal part medially, the area superomedia about twice as wide as long, half moon shaped.

ABDOMEN: Postpetiole coarsely punctured, with clearly defined median field; gastrocoeli fairly deep, each about as wide as their



Map 103. *Virgichneumon seticornutus* Heinrich

interspace, with distinct thyridia; tergites 2-4 coarsely and densely punctured.

DISTRIBUTION (map 103): From the following states: ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 11-16-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Clarke Co.: 1 female, 1 male, Athens, 12-VII-31-VIII-1969-1970, L. Hermann. LOUISIANA. Evangeline Co.: 1 female, Chicot State Park, 24-V-1971, G. Heinrich. Webster Co.: 1 female, Bistineau State Park, 18-IV-1972, G. Heinrich. All specimens in CGH II.

3. *Virgichneumon texanus* (Cresson), new combination

Map 104

Ichneumon texanus Cresson, 1877:159, male.

Melanichneumon texanus, Townes and Townes, 1951:286, male.

Melanichneumon (? subgenus) *texanus*, Heinrich, 1962:632-633, male.

Holotype: male, Texas; ANS.

SYSTEMATICS: Another, widely distributed, but rare species; distinguished by rich pale-yellow markings on the abdomen. The associated female of *texanus* has not been discovered, and that renders the definite generic placement of the species difficult. However, the structure of the gastrocoeli of the male, the type of carination of the propodeum, and the sculpture of the postpetiole suggest that the placement of the

species in the genus *Virgichneumon* probably is correct.

MALE: Length 7-11 mm. Black, the following ivory: mandible except teeth, face, clypeus, frontal and vertical orbits, about lower 1/2 of outer orbits, collare, pronotal ridge, subalarum, tegulae more or less extensively, scutellum, postscutellum, 2 lateral marks of variable extent on propodeum (sometimes occupying the apical 1/2 of areae dentiparae together with the entire areae posteroexternae and with the apices of areae spiraculiferae, sometimes reduced to small spots only), broad apical band on postpetiole, more or less extensive, medially narrowed, and sometimes almost interrupted apical band on 2nd tergite, more or less extensive latero-apical marks, or an apical band on 3rd tergite, usually apical mark on 7th tergite, all trochanters, coxae I and II, femora I and II apically and on anterior side, sometimes ventro-apical mark on coxae III, tibiae I and II (except black, longitudinal mark on ventral side beyond middle), tibiae III (except narrowly black base and broadly black apex), tarsi I and II almost entirely, tarsi III (except black apices of segments); tarsi III sometimes predominantly black, with only base of metatarsus ivory; flagellum black, ventrally brownish, without annulus; scape ventrally ivory.

FLAGELLUM: With 30-32 segments and with rather broad, oval tyloids on segments 5 or 6 to 14, the longest, on segments 8-12, not quite reaching to bases and apices of segments.

HEAD: Temple profile moderately narrowed behind eyes, with slightly curved outline; malar space about 1/2 as long as width of mandible base; frons finely punctured and coriaceous, with a faint, longitudinal, median impression below lower ocellus.

THORAX: Mesoscutum fairly densely punctured, glossy between punctures; anterior 1/3 of notauli distinct; scutellum distinctly convex, apically truncate, with rounded apical slope; carination of propodeum complete and strongly prominent; area superomedia usually slightly wider than long, receiving the oblique costulae at about the middle, usually rounded in front.

ABDOMEN: Median field of postpetiole clearly defined, densely punctured; gastrocoeli triangular, rather deeply impressed, with very distinct thyridia; tergites 2-4 fairly densely and strongly punctured, extremely finely coriaceous, glossy between punctures.



Map 104. *Virgichneumon texanus* (Cresson)

VARIATION: In two specimens from Maine the 7th tergite bears no apical ivory mark, the ivory marks on the propodeum are reduced to small spots, and the apical band on the 2nd tergite is interrupted medially.

DISTRIBUTION (map 104): Maine and Michigan, south to Texas, west to Alberta. LOUISIANA. Natchitoches Co.: 1 male, Natchitoches, 11-VI-1971, G. Heinrich. TENNESSEE. Henderson Co.: 3 males, Natchez Trail State Park, 1-15-VI-1972, G. Heinrich, D. Shaneck; CGH II. TEXAS. Type locality, Cresson (1877).

4. *Virgichneumon albomarginatus* (Cresson), new combination

Ichneumon albomarginatus Cresson, 1867: 297, male.

Melanichneumon albomarginatus, Townes and Townes, 1951:285, male.

Melanichneumon (*Vulgichneumon*) *albomarginatus*, Heinrich, 1962:611-612, female, male.

Holotype: male Mississippi, ANS. Neallotype: female, Maine; CGH II.

SYSTEMATICS: A fairly common species in the northeastern states and in the most southeastern parts of Canada; from the southeastern states, however, recorded only once in 1867 (the holotype from Mississippi). I collected in Mississippi during 2 seasons

and had several Malaise traps run in 2 different parts of the state for a few years, but no specimen of this species has been collected. It is possible that the holotype, if indeed collected in Mississippi and correctly labeled, has been a stray specimen, carried, as it sometimes happens, in a railroad car or motor vehicle over great distances across the country. It almost certainly does not belong to the fauna of the Austroriparian Zone, and it does not seem to be established in Mississippi.

FEMALE: Length 12-13 mm. Black, with rich white markings on head, thorax, and abdomen. Scutellum apically, or more extensively, white; propodeum with white marks; tergites 1-4 with apical, white bands, 5-7 with apical white marks. Tibiae white marked; coxae III with weak scopa. Flagellum black, with white annulus on segments 8-14, slender, bristle shaped.

MALE: Length 13-15 mm. Black; scutellum, postscutellum, median mark on mesoscutum, and marks on propodeum white; tergites 1-5 with apical white bands, 6 and 7 with apical white marks; all tibiae and tarsi and the coxae I and II extensively white marked. Flagellum black, scape ventrally white.

DISTRIBUTION: Quebec, Ontario, New Hampshire, Vermont, Ohio, Indiana, and 1 record (holotype) from Mississippi.

5. *Virgichneumon subcyaneus* *subcyaneus* (Cresson), new combination

Ichneumon pullatus Cresson, 1864:146, male.

Ichneumon subcyaneus Cresson, 1864:148, female.

Melanichneumon subcyaneus, Townes and Townes, 1951:280, female, male; citations; hosts.

Melanichneumon (*Vulgichneumon*) *subcyaneus subcyaneus*, Heinrich, 1962:610, female, male.

Holotypes: female, Massachusetts; ANS. *Ichneumon pullatus* Cresson, male, Illinois; ANS.

SYSTEMATICS: The only Nearctic species of this genus with uniformly black, or bluish-black abdomen, in females combined with black legs and black thorax (except entirely white scutellum in eastern specimens). Males are distinguished particularly by extensively white tibiae and tarsi, and the only laterally white face and clypeus.

FEMALE: Length 10-14 mm. Black; abdomen in fresh specimens with dark bluish hue. Scutellum white. Frontal orbits narrowly pale ferruginous, whitish toward upper end. Legs black, apex of femora I and the tibiae I ivory on anterior side. Flagellum black, with white annulus on segments 7 or 8 to 16 or 17; scape black.

FLAGELLUM: Bristle shaped, fairly long and slender, ventrally flattened beyond middle but not widened, slightly attenuated at the extreme apex, with 39-44 segments, the 1st fully twice as long as apically wide, the 6th or 7th square.

HEAD: Temple profile scarcely, the cheek profile more distinctly, narrowed, both slightly curved.

THORAX: Mesoscutum and scutellum rather flat, the former strongly and moderately densely punctured, glossy. Carination of propodeum distinct and complete, area superomedia large, usually wider than long, receiving costulae beyond middle, slightly narrowed toward base, broadly truncate in front, with hexagonal outline.

LEGS: Coxae III ventrally polished, strongly and moderately densely punctured, without scopa.

ABDOMEN: Stout, broad oval; 2nd tergite wider than long; postpetiole with clearly defined median field, usually finely and irregularly, longitudinally striate, with scattered punctures, sometimes almost smooth, or fairly densely punctured; 2nd and 3rd tergites moderately strongly and fairly densely punctured; gastrocoeli triangular, moderately deeply impressed, with distinct thyridia.

MALE: Length 12-16 mm. Black; abdomen, in fresh specimens, with metallic, dark blue hue; the following white: sides of face and of clypeus broadly, frontal orbits up to vertex, lower section of outer orbits, collare, pronotal ridge, subalarum, tegulae partially or entirely, scutellum, postscutellum, usually apical mark on coxae I and a small spot on anterior, apical edge of coxae II, apices of femora I and II, all tibiae dorsally, tibiae III except apices, an individually varying number of basal segments of all tarsi except apices, and scape ventrally.

FLAGELLUM: With 39-43 segments, and with long, bacilliform tyloids on segments 4 or 5 to 22 or 23.

HEAD: Malar space about 1/3 as long as width of mandible base.

THORAX: Mesoscutum and scutellum more convex than in female, notauli basally more distinct, area superomedia distinctly shorter and wider.

DISTRIBUTION: Eastern North America from Maine south to Georgia and Texas. (Specimens from Georgia and Texas in USNM identified by R. W. Carlson). Replaced in Colorado by the subspecies *cordatus* (Cresson), in California by subspecies *neutralis* (Cresson).

27. Genus *Rubicundiella* Heinrich Fig. 53

Rubicundiella Heinrich, 1962:566-567. Townes and Townes, 1966:261, 321 (1 species from Mexico).

Type species: *Ichneumon mucronatus* Provancher; original designation.

SYSTEMATICS: Related to *Barichneumon* Thomson and particularly to *Vulgichneumon* Heinrich, agreeing with the latter genus in the sexual dimorphic structure of the gastrocoeli, which are subobsolete in females, and elongate, with the rudimentary thyridia far removed from base of 2nd tergite, in males. Differs from the 2 genera in 2 decisive characters: (1) flagellum of males not nodose, lacking completely (on ventral side) the transverse bristle ridges characteristic for all other genera of the *Melanichneumon* group; (2) apices of areae dentiparae more or less projecting, forming in males (fig. 53) distinct apophyses, which

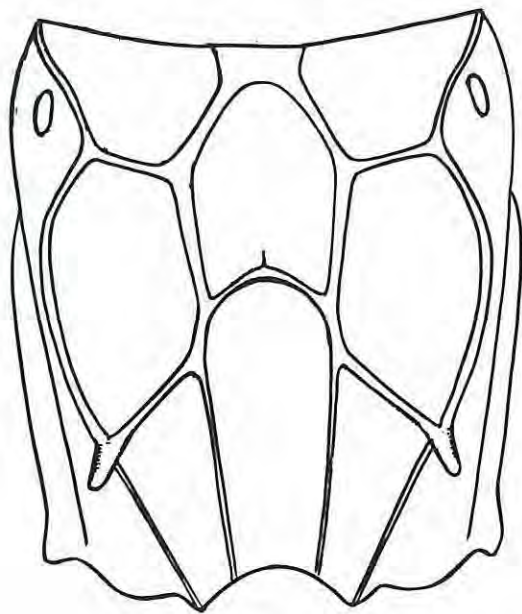


Fig. 53. *Rubicundiella mucronata* (Provancher) (male). Propodeum, dorsal view.

are less pronounced or even subobsolete in females. Only 1 species is known so far from Florida.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females short, filiform, ventrally flattened beyond middle, but not widened; of males without subapical transverse bristle ridges on ventral side, and thus not at all nodose, with a row of short-oval or short-bacilliform tyloids.

HEAD: Temple and cheek profiles moderately or considerably narrowed behind eyes or toward mandible base respectively; median field of face in both sexes somewhat prominent; mandibles normal.

THORAX: Mesoscutum rather flat; notauli obsolete in females, often basally indicated in males; scutellum flat in females, slightly convex in males, laterally weakly carinate basally, sometimes (in type species) to beyond middle; carination of propodeum prominent and complete; area superomedia hexagonal, about as long as wide or distinctly longer than wide, with costulae in, or near to, the middle, strongly narrowed from costulae toward area basalis; areae dentiparae in males with small apophyses, which are as a rule less prominent in females than in males, or in some species even lacking in females; spiracles comparatively small, elliptic.

LEGS: Moderately stout; coxae of females as a rule with scopa.

WINGS: Nervulus interstitial or postfurcal; areolet clearly pentagonal though sometimes considerably narrowed in front; radius straight and rather short.

ABDOMEN: Median field of postpetiole fairly well defined, usually irregularly longitudinally striate, sometimes, particularly in males, nearly smooth or only with vestiges of fine striation; gastrocoeli very small and shallow, often subobsolete as are also the thyridia, in females situated close to base of 2nd tergite, in males more or less elongate, with rudimentary thyridia usually far removed from base of 2nd tergite; tergites strongly and densely, sometimes very densely punctured, fairly strongly sclerotized and clearly separated from each other; in males the last tergite somewhat reduced and partially hidden under the 6th, the abdomen thus appearing slightly club shaped; in females the 6th and 7th tergites strongly narrowed, the ovipositor slightly projecting.

CHROMATIC CHARACTERS: Basic color in all species lighter or dark ferruginous, usually with restricted black, sometimes with

very restricted white markings; usually an unobtrusive white mark at base of stigma in forewing; sexual dichromatism inconspicuous.

DISTRIBUTION: Quebec, British Columbia, and Yukon Territory south to Kansas, Louisiana, and Florida; Mexico.

HOSTS: Recorded by Townes and Townes (1951:286). Pyraustinae and Amphipyridae (*Rubicundiella rubicundus* (Cresson), by Heinrich (1962). Heliothiinae and Sesiidae (*Rubicundiella simplicior* Heinrich), and confirmed by reared specimens in USNM, Pyralidae (*Rubicundiella annulicornis* (Ashmead)).

Key to southeastern species of *Rubicundiella* Heinrich

Females

1. Coxae III ventrally densely and coarsely punctured, without trace of scopa. (Area superomedia elongate, coffin shaped, with horizontal costulae at anterior 1/3, more than twice as long as wide; length 7-10 mm). 1. *mucronata* (Provancher)
- Coxae III with more or less distinct scopa. 2
2. First segment of flagellum fully twice as long as apically wide; area superomedia coffin shaped, considerably longer than wide; femora III and particularly femora II, in lateral view considerably narrower medially in comparison to their length than in the alternative species. (Length 6-9 mm). 2. *annulicornis* (Ashmead)
- First segment of flagellum about 1.5 times as long as apically wide; area superomedia hexagonal, not, or not much longer than wide; femora III and particularly femora II in lateral view considerably wider medially, in comparison to their length than in the alternative species. (Length 6-8 mm)... 3. *perturbatrix* Heinrich

Males

1. Flagellum without annulus; apophyses of propodeum not very long. (Length 7-10 mm). 3. *perturbatrix* Heinrich
- Flagellum with white annulus; apophyses of propodeum long and pointed. 2
2. Scutellum and usually also face and clypeus ivory. (Length 10-11 mm). 1. *mucronata* (Provancher)

- Scutellum, face and clypeus orange ferruginous like the entire body. (Length 7-10 mm). 2. *annulicornis* (Ashmead)

1. *Rubicundiella mucronata* (Provancher) Fig. 53, Map 105

Ichneumon mucronatus Provancher, 1975a: 24, 81, "female" = male; Provancher, 1883: 290, male.

Melanichneumon rubicundus, Townes and Townes, 1951:286, male (partim: *mucronatus* Provancher as synonym).

Rubicundiella mucronata, Heinrich, 1962: 568-569, male.

Holotype: male, Quebec; PMQ. Neallotype: female, Louisiana, Kasatchie Forest, Natchitoches Co., 10-VI-1971; CGH II.

SYSTEMATICS: Only 2 males of this genus with white annulus on the flagellum, *mucronata*, and the male attributed to the species *annulicornis* (Ashmead), occur in the southeastern states; both are widely distributed and rather common; they share the white annulus of flagellum, differ tangibly only in color of face and scutellum, but not in structure. It seemed possible that they could represent 2 subspecies or else individual variations of 1 species; the former hypothesis can be disproved by the fact that both males were found to be sympatric in most of the southeastern states; the alternative hypothesis, that they represent individual variations is unlikely also, as the sympatric populations of females contain 2 distinct, though extremely similar species. The 2 forms of males are being treated, therefore, as 2 distinct species. The association of sexes, however, cannot be considered as definitely confirmed, as it has been established on account of corresponding size and some common records only.

The species *mucronata* and *annulicornis* are distinguished in males by the white annulus of flagellum, and in both sexes by the structure of propodeum (fig. 53) with elongate, narrow, parallel-sided areae dentiparae and area superomedia with costulae far before the middle and narrowed from costulae toward area basalis ("coffin-shaped"); the areae dentiparae bear considerable apophyses in males, those in females smaller.

The *mucronata* males differ from *annulicornis* by ivory scutellum and, as a rule, uniformly ivory face and clypeus (varying to partially or predominantly orange), the

female mainly by complete absence of scopa on coxae III.

FEMALE: Length 7-10 mm. Ferruginous, the 7th tergite in specimens from Florida with conspicuous apical white mark (as is always present in *annulicornis*), in specimens from other southeastern states with apical white margin only; usually the 5th tergite basally, the 6th and 7th predominantly blackish; all coxae ferruginous, the rest of legs more extensively black or blackish than in *annulicornis*; tibiae III and tarsi III sometimes entirely black, at least apically extensively blackish infuscated or black; femora and tibiae I and II more or less extensively blackish on dorsal side except basally; flagellum black, with dorsal white annulus on segments 7 or 8 to 12, the section before annulus varying from brownish to black; scape ventrally brownish.

FLAGELLUM: Filiform, fairly short, not widened beyond middle, with 28-29 segments, the 1st barely twice as long as apically wide, in lateral view the 6th square.

HEAD: As in *annulicornis*, the temple profile slightly narrowed behind eyes, slightly curved; cheek profile less narrowed toward mandible base than in *annulicornis* (fig. 55), malar space distinctly shorter than width of mandible base; mandibles comparatively slightly wider than in *annulicornis*; cheeks, particularly the apical part, more densely and more coarsely punctured than in *annulicornis*.

THORAX: Mesoscutum and scutellum densely and coarsely punctured, punctures toward apex of scutellum running into longitudinal rugae; scutellum laterally carinate almost to the apex; propodeum long, the area posteromedia about as long as the horizontal part medially; area superomedia elongate, with horizontal costulae at anterior 1/3, more than twice as long as wide, nearly parallel sided behind costulae, narrowed from costulae toward area basalis, coffin shaped; areae dentiparae also elongate, narrow, and parallel sided, the areae dentiparae apically pointed and slightly projecting; spiracles of propodeum rather short, barely more than twice as long as wide; pleura very coarsely and very densely rugose punctate, including speculum.

LEGS: Coxae III ventrally densely and coarsely punctured, without a trace of scopa.

ABDOMEN: Median field of postpetiole clearly defined, densely longitudinally striate, the lateral fields coarsely punctured; tergites 2 and 3 very densely and coarsely

punctured all over, gastrocoeli and thyridia small and indistinct; 4th tergite finely and indistinctly punctured; ovipositor somewhat projecting.

MALE: Length 10-11 mm. Orange, scutellum ivory; usually ivory also: face and clypeus entirely, collare, pronotal ridge and base narrowly, tegulae, coxae and trochanters I and II; median field of face, sometimes entire face, varying occasionally to orange; 7th tergite with indistinct ivory mark; mesopleura sometimes extensively ivory tinged; apices of tibiae III, the tarsi III, sometimes also the femora III apically, blackish infuscated; flagellum black, with dorsal white annulus on segments 11 or 12 to 16 or 18, ventrally brown, as are often the basal segments also on dorsal side; scape orange.

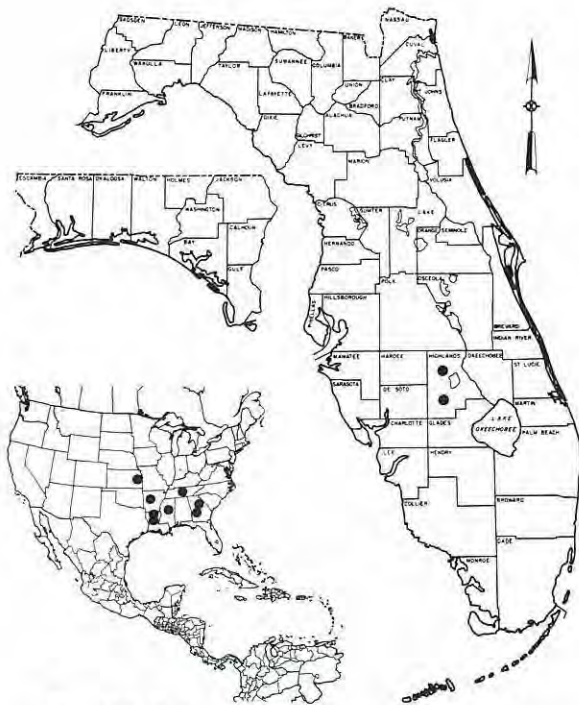
FLAGELLUM: With 32-33 segments and with short, narrow tyloids on segments 6 or 7 to 15 or 16 or 17, the longest covering only about the median 1/3 of the length of segments.

HEAD: Temple profile slightly narrowed behind eyes, curved; malar space nearly 1/3 as long as width of mandible base.

THORAX: Notauli indicated only at base; scutellum slightly raised above postscutellum, laterally carinate as in female; propodeum (fig. 53), including carination, as in female, except for the areae dentiparae which are drawn out into conspicuous apophyses.

ABDOMEN: Median field of postpetiole clearly defined, its sculpture markedly finer than in female, sometimes nearly smooth, sometimes with some longitudinal rugosity; gastrocoeli narrow and elongate, indicated by some longitudinal rugae, the thyridia small, removed from the base of 2nd tergite; 2nd tergite considerably longer than apically wide.

DISTRIBUTION (map 105): Quebec, south to Florida, west to Louisiana, Arkansas, and Kansas. ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 9-V-1972, G. Heinrich. FLORIDA. Highlands Co.: 1 male, Archbold Biological Station, 7-20-VII-1970, G. Heinrich; 2 females, Highlands Hammock State Park, 24-IX-15-X-1969, R. Miller. GEORGIA. Clarke Co.: 11 males, Athens, 27-VII-7-IX-1970, L. Hermann. Monroe Co.: 2 females, 3 males, Forsyth, 14-IV-14-VII-1969-1971, F. Naumann. KANSAS. Douglas Co.: Lawrence, 1 male, X-1952, G. Heinrich. LOUISIANA. Avoyelles Co.: 1 female, Eola, 22-29-V-1972, D. Shaneck. Evangeline Co.: 1 female, 18 males, Bayou Chicot, Chicot State



Map 105. *Rubicundiella mucronata* (Provancher)

Park, 12-VI-18-VIII-1971, 22-29-III-1972, D. Shaneck. Natchitoches Co.: 1 female, Kasatchie Forest, 10-VI-1971, G. Heinrich; 1 male, Powhatan, 16-20-VI-1971, G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 10 females, 13 males, 10-IV-9-IX-1971, C. Sartor. TENNESSEE. Henderson Co.: 1 female, 4 males, Natchez Trail State Park, 2-18-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

2. *Rubicundiella annulicornis* (Ashmead)

Fig. 54-55, Map 106

Colpognathus annulicornis Ashmead, 1890: 396, female.

Melanichneumon annulicornis, Townes and Townes, 1951:285, female.

Rubicundella annulicornis, Heinrich, 1962: 569-570, female, male.

Holotype: female, Louisiana; USNM. Neallotype: male, Florida, Highlands Co.; CGH II (present designation).

SYSTEMATICS: This species is extremely similar to *mucronata* (Provancher). Males of both species share the white flagellar annulus, the strongly developed apophyses of the propodeum, and the elongate, coffin-shaped area superomedia; they differ in the color of scutellum, face, and clypeus (not ivory in *annulicornis*). Females of *annulicornis* are best distinguished from *mucron-*

ata by the scopa on coxae III, the scopa, however, is not dense and in some specimens indistinct; the structure of the cheek profile (more strongly narrowed toward mandibles than in *mucronata*) offers an additional distinctive character for the female.

On the average, distinctly smaller than *mucronata*.

FEMALE: Length 6-9 mm. Ferruginous, the 7th tergite with apical white mark, basic color of tergites 6 and 7 more or less infuscated; apices of femora III and tibiae III, and the tarsi III, often also apices of femora II and of tibiae II blackish infuscated; rarely, all femora on dorsal side and the tibiae II and III predominantly blackish; flagellum black, with dorsal white annulus on segments 6 or 7 to 11 or 12; basal 3 or 4 segments and scape brown, ventrally ferruginous.

FLAGELLUM: Filiform, fairly short, not widened beyond middle, with 25-28 segments, the 1st twice as long as apically wide, in lateral view the 7th square.

HEAD (fig. 54, 55): Temple profile slightly narrowed behind eyes, slightly curved; cheek profile markedly narrowed toward mandibles, almost straight; malar space slightly shorter than width of mandible base; cheeks fairly finely and toward apex sparsely punctured.

THORAX: Sculpture of mesoscutum somewhat finer than in *mucronata*, more dense and subopaque; propodeum slightly shorter

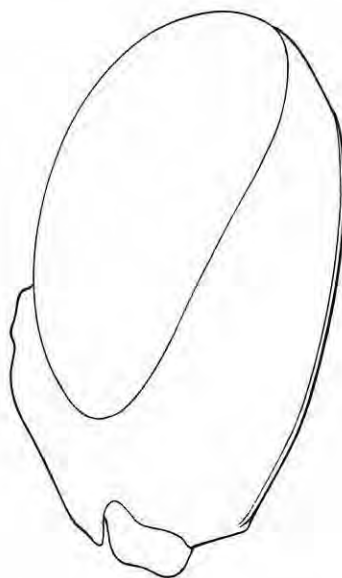


Fig. 54. *Rubicundiella annulicornis* (Ashmead) (female). Head, lateral view.

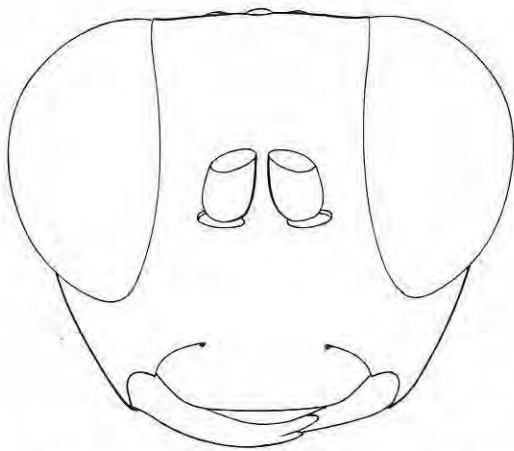


Fig. 55. *Rubicundiella annulicornis* (Ashmead) (female). Head, frontal view.

than in *mucronata*, the area posteromedia slightly longer than the horizontal part medially, the area superomedia on the average slightly shorter (as compared to its length) than in *mucronata*, the apophyses of areae dentiparae usually more pronounced; otherwise as in *mucronata*.

LEGS: Coxae III ventrally densely and slightly less coarsely punctured as in *mucronata*, with an ill defined, not very dense scopa.

ABDOMEN: Median field of postpetiole clearly defined, as in *mucronata*, but usually with finer sculpture, with fine and sparse striation and with scattered punctures or nearly smooth; otherwise as in *mucronata*.

MALE: Length 7-10 mm. Uniformly orange ferruginous, including scutellum, face, and clypeus; apex of tibiae III and the tarsi III, sometimes also apex of femora III infuscated; flagellum black, ventrally, sometimes also basally brownish, with dorsal white annulus on segments about 11-17; scape orange.

FLAGELLUM: With 29-31 segments and with short, narrowly-oval tyloids on segments 5-14 or 15.

DISTRIBUTION (map 106): Central Florida, west to Louisiana and Arkansas. **ARKANSAS.** Garland Co.: 2 females, Ouachita State Park, 8-17-V-1972, G. Heinrich, D. Shaneck. **FLORIDA.** Alachua Co.: 1 female, Gainesville, 3-IV (FSCA). Dade Co.: 1 male, South Miami, 4-XII (FSCA). Duval Co.: 1 male, Eastport, 5-II-1967 (FSCA). Hernando Co.: 1 male, 13-III (FSCA). Highlands Co.: 11 males, Archbold Biological Station, 11-IV-30-

VIII-1967-1968, G. Heinrich; 5 females, 15 males, Highlands Hammock State Park, 8-IV-28-X-1968-1971, G. Heinrich, D. Radtke. Lake Co.: 1 male, Clermont, 3-I-1964 (FSCA); 1 male, Leesburg, 18-I (FSCA). Lee Co.: 1 male, Ft. Myers, 18-VIII-1967, G. Heinrich. Manatee Co.: 1 male, Palma Sola, 30-I-1967 (FSCA). Pinellas Co.: 1 female, St. Petersburg, 22-XII-1964 (FSCA). **GEORGIA.** Monroe Co.: 6 males, Forsyth, 12-VI-17-X-1970, F. Naumann. **LOUISIANA.** Webster Co.: 3 females, Bistineau State Park, 29-IV-4-V-1972, G. Heinrich, D. Shaneck. **MISSISSIPPI.** Oktibbeha Co.: 1 female, Starkville, 11-28-VII-1971, C. Sartor. Yalobusha Co.: 3 females, 7 males, Water Valley, 20-IX-9-XI-1970, 6-15-III-1971, M. Horan. **TENNESSEE.** Henderson Co.: 3 females, Natchez Trail State Park, 2-24-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II unless noted otherwise.

HOSTS: *Udea rubigalis* (Gn.) *Hellula rogatalis* (Hulst) (Pyralidae). (Reared specimens from Florida in USNM, teste R. W. Carlson).

3. *Rubicundiella perturbatrix* Heinrich Map 107

Ichneumon rubicundus Cresson, 1864:176, female; name preoccupied.

Melanichneumon rubicundus, Townes and Townes, 1951:286, female; partim.

Melanichneumon mucronatus, Walkley, 1958:49, female; partim.



Map 106. *Rubicundiella annulicornis* (Ashmead)

Rubicundiella perturbatrix, Heinrich, 1962: 577-578, female, male; new name.

Holotype: female, Illinois; ANS. Neallotype: male, Kansas; CGH II. Present designation.

SYSTEMATICS: A small species, distinguished in both sexes by: (1) sharply pointed, though short, apophyses of the propodeum; (2) very restricted black or blackish markings on apical tergites; (3) not extremely dense puncturation on tergites 2 and 3, with glossy spaces between punctures well recognizable (at 60 times magnification) on lateral sections of these tergites; (4) obsolete gastrocoeli. In females by rather short, basal segments of flagellum and a distinct scopa on coxae III. Distinguished clearly and easily from *blanchardi* (Davis) by the markedly smaller size and the characters (1), (2), and (4). The characters (1), (2), (3), and (4), particularly, however the ferruginous mesosternum, distinguish the males from *deutoremelas* Heinrich (with black mesosternum). Of the species *deutermelas*, recorded from Maine and Yukon Territory, only the male is known. The female may be very similar to *perturbatrix*, but should be recognizable by, at least, the characters (2) and (3).

FEMALE: Length 6-8 mm. Pale ferruginous; 5th tergite apically and tergites 6 and 7, usually moderately infuscated; the 7th tergite apically whitish. Apex of femora III and the tarsi III blackish; in northern specimens usually also trochanters and the femora I and II dorsally infuscated, the prepectus medially, and mesolcus apically, black; in southern specimens thorax uniformly ferruginous. Flagellum basally brownish or ferruginous, apically black, with white annulus on segments 6 or 7 to 12 or 13.

FLAGELLUM: Filiform, ventrally flattened beyond middle but not widened, with 25-29, usually 27 segments, the 1st about 1.5 times as long as apically wide, the 5th square.

HEAD: Temple profile scarcely narrowed, slightly curved; cheek profile somewhat narrowed toward mandibles, barely curved; malar space as long as width of mandible base.

THORAX: Mesoscutum moderately densely punctured, glossy; scutellum almost smooth, laterally carinate at the base; area supermedia hexagonal, usually about as long as wide, sometimes slightly longer than wide, distinctly narrowed from costulae toward base; apex of areae dentiparae terminated by a small, pointed tooth.

ABDOMEN: Postpetiole with distinct, usually longitudinally striate, median field, the lateral fields punctured; gastrocoeli extremely small, subobsolete; 2nd and 3rd tergite rather densely punctured, but on the lateral sections (visible by 60 times magnification) glossy spaces between punctures recognizable.

MALE: Length 7-10 mm. Ferruginous; the following black or blackish: base of prosternum, sometimes also its sides, base or most of prepectus (except exterior belt all around), mesolcus at least apically, base of coxae III, tarsi III, apex of tibiae III, in northern specimens apex of femora III dorsally and usually apex of 5th tergite and tergites 6 and 7; in southern specimens abdomen often entirely ferruginous; flagellum dorsally blackish, ventrally pale brownish, scape ventrally ferruginous.

FLAGELLUM: With 28-31 segments and with longish-oval tyloids on segments 5-15.

THORAX: Apophyses of propodeum much more conspicuous than in female.

DISTRIBUTION (map 107): Illinois (type locality), Ontario, Quebec, Maine, Georgia, Florida, Texas, west (according to Townes and Townes, 1951:286) to "100° W in Transition, Upper Austral and Lower Austral Zones." As Townes' species *rubicundus* was composed of several different species, the western borders of the distribution of *perturbatrix* Heinrich need further con-



Map 107. *Rubicundiella perturbatrix* Heinrich

firmation. GEORGIA. Atlanta, 1 male, 1-VIII-1928. Fattig Collection. FLORIDA. (Heinrich, 1962:577, no specific record given). TEXAS. Hill Co.: 1 female, Blum, 20-X-1952, G. Heinrich. CGH II.

HOSTS: Pyralidae: *Ostrinia nubilalis* (Hbn.) (Townes and Townes, 1951:286; confirmed also by R. W. Carlson). *Spodoptera exigua* (Hbn.) and *Macronoctua onusta* Grote, both also recorded for *Melanichneumon rubicundus* (Cresson); as hosts of *Rubicundiella perturbatrix*, need further confirmation.

28. Genus *Melanichneumon* Thomson Fig. 56

Melanichneumon Thomson, 1893:1954; partim. Townes and Townes, 1951:284-287, partim (5 Nearctic species). Townes, et al., 1961:360 (3 Indo-Australian species). Heinrich, 1962:583-604 (13 Nearctic species). Townes, et al., 1965:429-432 (11 eastern Palearctic species). Townes and Townes, 1966:261 (1 species from Mexico). Heinrich, 1972:201-208 (key to species of southeastern Nearctic Region; description of 1 new species and 2 new subspecies).

Type species: *Ichneumon spectabilis* Holmgren; designated by Ashmead, 1900.

SYSTEMATICS: In my 1st attempt to reclassify the multitude of Holarctic species included until 1962 in the genus *Melanichneumon*, I subdivided the genus into 3 subgenera: *Melanichneumon* proper, *Vulgichneumon* Heinrich, and *Barichneumon* Thomson. All 3 subgenera were treated later by Townes, et al., (1965) as distinct genera, a point of view adopted in this paper.

The genus *Melanichneumon* Thomson, in the above-explained interpretation, is distinguished by the following characters (of which the 1st, is the most decisive): (1) flagellum of female, as a rule, short, lanceolate, considerably to extremely widened beyond middle and ventrally flattened, strongly attenuated toward apex; (2) area superomedia (fig. 56) large, in females half oval or Gothic arch shaped, in males more or less abbreviated and thus widened, horse-shoe shaped, or sometimes halfmoon shaped; (3) gastrocoeli small, scarcely impressed, with indistinct or small thyridia; (4) last tergites in most Nearctic species with white apical marks, and in majority of all species anterior tergites with latero-apical white marks; (5) postpetiole distinctly and more or less densely punctured, never striate or rugose.

The genus is represented by only 4 species in Europe, but apparently by numerous species in the Nearctic Zone. The North American forms combine an unusually high degree of individual and geographical variability in color, with great structural monotony, and hence constitute, next to the western *Amblytelina*, the most difficult group taxonomically among the Ichneumoninae of North America. The paradigm of variability demonstrated below by the tables for the species *heiligbrodtii* Cresson suggests that the achievement of a satisfactory specific classification of this group will need much more research and observation over a long period of time.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females as described above. Of males distinctly nodose, with distinct, subapical bristle ridges on ventral side nearly from base on, and with a row of small bacilliform or short-oval tyloids. (In almost all known species of the Holarctic Region with white annulus in both sexes.)

HEAD: Normal, with temple profile and cheek profile more or less narrowed behind eyes and toward mandibles respectively; malar space fairly short, in males distinctly shorter than in females; mandibles normal, with large apical and short subapical tooth.

THORAX: Normal; mesoscutum somewhat longer than wide, slightly convex, with notauli weakly indicated at base only, always rather densely punctured; scutellum not, to slightly, raised above postscutellum, laterally not carinate, except sometimes weakly and incompletely, propodeum with complete and prominent carination; area posteromedia usually somewhat longer than horizontal part medially, particularly in males; area superomedia as described above, with costulae usually in or somewhat before middle, sometimes in front not clearly separated from area basalis.

LEGS: Stout or moderately stout; coxae III of females without scopa.

WINGS: Nervulus tending to be slightly postfurcal; areolet pentagonal, but distinctly narrowed in front; radius approximately straight.

ABDOMEN: Similar in appearance to *Coelichneumon* Thomson, that is: gradually tapering toward apex, oxypygous, the ovipositor usually somewhat projecting; postpetiole with indistinct to fairly well delimited median field, always distinctly and more or less densely punctured; gastrocoeli as described above; anterior tergites always

distinctly and densely punctured, without rugosity or striation.

DISTRIBUTION: Holarctic Region.

**Key to species of
Melanichneumon Thomson
of the southeastern states**

Females

1. Tergites 6 and 7 without apical white marks. (Mesoscutum entirely or only laterally, black, always with 2 longitudinal, median and 2 lateral ivory lines; femora III apically never infuscated). 2
- Tergites 6 and 7, or at least the 7th tergite, with distinct, apical, white mark. (Basic color of entire mesoscutum usually ferruginous to orange, with or without longitudinal ivory lines, rarely mesoscutum uniformly black). 3
2. Basic color of mesoscutum, at least medially, red; propleura, horizontal part of propodeum, and 1st tergite entirely or partially red; mesopleura partially red. (Length 9-11 mm).
..... 3 a. *honestus honestus* Cresson
- Basic color of entire mesoscutum, propleura, 1st tergite, and usually horizontal part of propodeum black; mesopleura ivory, except only the black uppermost section. (Length 10-12 mm).
..... 3 b. *honestus milleri* Heinrich
3. Basic color of head and entire thorax black; coxae III with distinct scopa. (Tergites 1-5 red, without ivory markings; tergites 6 and 7 with apical white marks; length 8-10 mm).
..... 6. *leviculus* (Cresson)
- Basic color of head and thorax ferruginous or orange; coxae III without scopa. 4
4. Tergites 1-3 without apico-lateral ivory marks or apical bands; space between punctures on lateral lobes of mesoscutum and on tergites 1-3 not finely coriaceous but smooth and glossy. (Temple profile only moderately narrowed behind eyes, strongly curved; coxae III apico laterally on ventral side fairly densely pilose; length 9 mm)....
..... 7. *complicatus*, new species
- Tergites 1-3 with apico-lateral ivory or yellow marks or bands; space between punctures on mesoscutum and anterior tergites finely coriaceous rugose. ... 5
5. Flagellum more slender than in all alternative species, only moderately widened beyond middle, the widest

segment on the flat side only 2.5 times as wide as long; mesopleuron and metapleuron bright ferruginous red, each with conspicuous, apical, ivory mark in the lower corner. (Flagellum with 41-43 segments, apically drawn out into a long and very slender end, segments 1-6 (counted backward from the apical segment) not wider than long; mesoscutum bright ferruginous red, with 2 short, median and 2 short, lateral, longitudinal, ivory lines; length 11 mm).

- 6. *margaritae* Heinrich
- Flagellum strongly widened beyond middle, the widest segment 3-3.5 times as wide as long on the flat side; mesopleuron and metapleuron differently colored. 6
6. Temple profile barely narrowed behind eyes, strongly curved; mesoscutum orange, with 2 percurrent, longitudinal, median and 2 short, lateral ivory lines. (Flagellum with 40 segments, the widest segment more than 3 times as wide as long, the apex drawn out into a fairly long and fairly slender end, segments 1-5, counted backwards from apex not wider than long; tergites 1-3 with percurrent, apical, ivory bands; mesosternum and mesopleura ivory tinged; length 11 mm).
.. 4. *mystificans* Heinrich (tentative)
- Temple profile strongly narrowed behind eyes, barely curved; mesoscutum without percurrent, median, ivory lines. (Flagellum with 33-38 segments, lanceolate, the widest segment 3-3.5 times as wide as long. 7
7. Basic color of entire body pale orange; puncturation of mesoscutum and anterior tergites markedly finer than in the alternative species; ivory band around eyes interrupted at temples, or at least reduced to a narrow line. (Length 9-11 mm).
... 1 b. *disparilis flavidops* Heinrich
- Basic color of entire body chestnut red; puncturation of mesoscutum and of anterior tergites markedly denser and coarser than in the alternative species; ivory band around eyes not interrupted on temples. (Length 10-13 mm).
..... 2. *heiligbrodtii* (Cresson)

Males

1. Basic color of entire body, including legs, black. (Mesoscutum with 4 longitudinal white stripes; all tergites with apical

- white bands or marks; length 10-11 mm). 5. *margaritae* Heinrich
- At least several tergites partially or predominantly red or orange, and/or legs extensively so colored. 2
2. Mesoscutum black, without white pattern; abdomen red, the 1st and the 7th tergite (or 6th and 7th) black, only the 1st tergite apically ivory. (Length 10-11 mm). 6. *leviculus* (Cresson)
- Mesoscutum black or red, always with white pattern; abdomen otherwise colored. 3
3. Tergites 1-2 or to 4 or to 5 basally extensively black, with apical ivory bands, chestnut red between black and ivory sections. (Malar space black marked; 7th tergite with apical white mark). 4
- Tergites 1-5 differently colored. 5
4. Mesosternum and the mesopleuron chestnut red, except black band below subalarum, sometimes with restricted and irregular ivory markings; apices of femora III not infuscated. (Length 10-14 mm). 2. *heiligbrodtii* (Cresson)
- Mesosternum and the mesopleuron uniformly ivory, except about the black upper 1/3; apices of femora III blackish infuscated. (Length 11 mm). 4. *mystificans* Heinrich
5. Seventh tergite without white mark; abdomen orange, tergites 1-4 with continuous, narrow and even, apical ivory bands. Mesoscutum black, with only 2 short, apically convergent, median ivory lines. (Tip of femora III black, extreme base of tibiae III ivory; length 11 mm). see 7. *complicatus*, new species
- Seventh tergite with apical ivory mark; abdomen otherwise colored. (Mesoscutum usually with 2 median, longitudinal, ivory lines and with 2 short, lateral, ivory lines). 6
6. Basic color of abdomen and thorax fairly dark chestnut red; malar space with black mark; mesosternum and mesopleuron entirely or predominantly chestnut red, at the most with irregular, restricted ivory pattern; puncturation of mesoscutum and tergites 1-4 denser and coarser than in alternative species. (Mesoscutum with 2 or 4 longitudinal, ivory lines, the basic color varying from chestnut red to black; apices of femora III not infuscated; length 10-14 mm). ... 2. *heiligbrodtii* (Cresson) (Florida populations)
- Basic color of entire abdomen either orange red or anterior tergites broadly black and ivory banded; malar space never black marked; mesosternum and mesopleuron predominantly ivory; puncturation of mesoscutum and anterior tergites less coarse and less dense. ... 7
7. (a) Horizontal part of propodeum and the propleuron basally black, apically more or less extensively orange ferruginous, the horizontal part of propodeum apically and/or its apical carinae never ivory; (b) hypopygium always ferruginous, never ivory; (c) in the majority of specimens only tergites 1-3 with, laterally widened, medially narrowed, apical, ivory bands, rarely also the 4th tergite with such band; (d) in the majority of specimens femora III apically infuscated; (e) basic color of mesoscutum usually medially or entirely orange ferruginous, varying occasionally to entirely black; (f) anterior tergites uniformly orange, without infuscations. (Length 9-11 mm). ... 1 b. *disparilis flavidops* Heinrich
- (a) Horizontal part of propodeum extensively to entirely black, the apices of areae dentiparae and the apical carinae often ivory but never orange ferruginous; (b) hypopygium almost always ivory; (c) tergites 1-4 with apical ivory bands; (d) femora III never apically infuscated; (e) basic color of entire mesoscutum always black; (f) anterior tergites, at least the lateral field of postpetiole partially infuscated; often tergites 1-4 basally extensively black. (Length 11-13 mm). ... *honestus* (Cresson) 8
8. Basic color of abdomen orange ferruginous, anterior tergites with apical ivory bands, basally not black, except tergites 1 and 2 usually restrictedly infuscated. 3 a. *honestus honestus* (Cresson)
- Tergites 1-4 basally extensively black, apically extensively ivory; tergites 5 and 6 ferruginous, basally black. 3 b. *honestus milleri* Heinrich

**1a. *Melanichneumon disparilis*
disparilis (Cresson)**

Fig. 56

Ichneumon disparilis Cresson, 1867:307, female.

Melanichneumon disparilis, Townes and Townes, 1951:285, female.

Melanichneumon (Melanichneumon) disparilis, Heinrich, 1962:587-589, female, male.

Holotype: female, Connecticut; ANS. Neallotype: male, Maine; CGH II.

SYSTEMATICS: Females of this species are distinguished by the combination of the following characters: (1) ferruginous or orange basic color of the entire mesoscutum and abdomen, the latter always with apical ivory marks on tergites 6 and 7, the former with the scutellum and postscutellum ivory; (2) scutellum with sharp lateral edges to beyond middle, the edges not forming elevated carinae; (3) flagellum rather short, lanceolate, gradually tapering and pointed apically, but not drawn out into very long and thin, bristle-shaped ends; (4) mesopleura without ivory parts or marks, uniformly orange, black marked more or less extensively on the upper part.

In both sexes tergites 1-3 (sometimes 1-4) bear latero-apical yellow marks or medially narrowed bands; in males the basic color of the mesoscutum is black, in southeastern specimens often varying to medially ferruginous, rarely predominantly ferruginous, always with 2 longitudinal, median ivory lines and 2 short, longitudinal, lateral ivory lines; exceptionally prescutellar carinae ivory; the apices of femora III are, in both sexes, usually narrowly black in southern populations, always more extensively black in northern populations.

FEMALE: Length 8-10 mm. Head ferruginous, with only vertical orbits broadly yellow and with usually frontal orbits and sometimes facial orbits narrowly yellow; thorax ferruginous, with usually yellow the extreme apex of pronotal ridge and subalarum, always yellow scutellum, postscutellum, and collare; the following black: prosternum and prepectus basally to entirely, pronotum behind collare, usually antennal cavities, ocellar and occipital regions, often also propleura extensively, mesolcus and band below subalarum, often mark on mesopleura in front of coxae II, areae coxales, apex of area posteromedia, basal furrow of scutellum and of propodeum, and axillary troughs; legs ferruginous, coxae

I and II sometimes dorsally at base ivory; the following black: coxae II and III dorsally at least at apex, sometimes predominantly, rarely dorsally uniformly, tibiae III apically, femora III apically to predominantly; abdomen ferruginous, tergites 6 and 7 always with apical, yellow mark, often the 2nd or 1st and 2nd tergite, rarely also the 3rd tergite with apico-lateral yellow marks; flagellum black, with dorsal white annulus on segments 6 or 7 to 13 or 14 or 15.

FLAGELLUM: Lanceolate, with 33-35 segments, the 1st less than twice as long as apically wide, the 6th in lateral view square, the widest 3-3.5 times as wide as long, gradually tapering toward the pointed apex.

HEAD: Temple profile and cheek profile rather strongly narrowed, with nearly straight outlines; occiput and temple declivous from hind border of ocelli and eyes; malar space about as long as width of mandible base.

THORAX: Mesoscutum only slightly convex, finely and rather densely punctured; notauli basally indicated; scutellum slightly convex and somewhat raised above postscutellum, with sharp, but not tangibly raised lateral edges; carination of propodeum (fig. 56) distinct and complete, the area superomedia usually slightly longer than wide, semioval to horseshoe shaped.

LEGS: Coxae III ventrally finely and densely punctured; femora III rather stout.

ABDOMEN: Postpetiole without clearly defined median field, neatly (medially sometimes sparsely) punctured, polished between punctures; gastrocoeli superficial, thyridia subobsolete; tergites 2-3 fairly densely and moderately coarsely, the 4th tergite finely punctured.

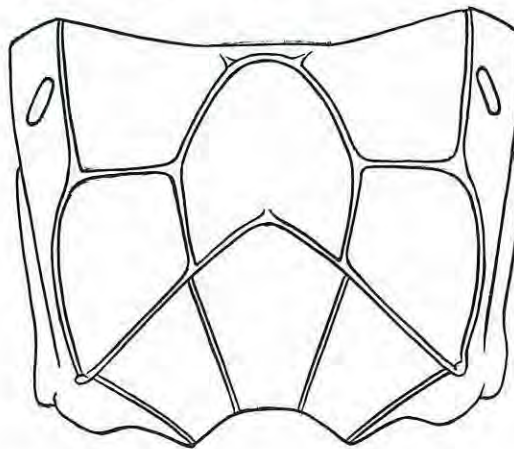


Fig. 56. *Melanichneumon disparilis disparilis* (Cresson) (female). Propodeum, dorsal view.

MALE: Length 9-11 mm. Head ivory, the following black: antennal cavities, middle of frons narrowly, ocellar, occipital, and temple regions; thorax black, ferruginous, and ivory; the following black: basic color of mesoscutum, pronotum, and prepectus, base of prosternum, nearly upper 1/3 of mesopleura, mark on mesopleura in front of coxae II, basal furrow of propodeum all around, base of horizontal part more or less extensively (sometimes including area superomedia), area posteromedia and areae coxales more or less extensively, sometimes also areae metapleurales more or less extensively, basal furrow of scutellum, and axillary troughs; the following are ivory: collare, pronotal ridge and base broadly, subalarum, tegulae in part, 2 longitudinal, median stripes on mesoscutum, 2 short, lateral stripes on mesoscutum, scutellum, postscutellum, mark on carinal triangle, prosternum except base, mesosternum predominantly (varying to predominantly ferruginous), often anterior and lower part of mesopleura, exterior belt of prepectus, and the areae posteroexternae; rest of mesopleura, metapleura, and propodeum ferruginous; legs ferruginous, the following ivory: all 1st trochanters, coxae I and II entirely, and dorsal mark on interior side of coxae III; extreme base of tibiae III and all tarsi ivory tinged, the metatarsus III orange tinged; the following black: apex of femora III and of tibiae III, and coxae III basally and on inner and outer side more or less extensively (the ventral side usually ferruginous and never ivory marked); abdomen ferruginous, with the following yellow markings: apical mark on 7th tergite, sometimes also a small, apical, median band on the 6th tergite, triangular, lateral marks on tergites 1-3, these marks are narrowed and usually confluent toward the middle of these tergites; flagellum black, ventrally brown, with complete white annulus on segments 10 or 11 to 18 or 19 or 20; scape ventrally ivory.

FLAGELLUM: With 31-34 segments and with short, bacilliform tyloids on segments 7 or 8 to 14 or 15.

HEAD: Malar space about 1/3 as long as width of mandible base; temple profile distinctly narrowed behind eyes, slightly curved.

THORAX: Scutellum and mesoscutum more convex than in female; mesoscutum finely and densely punctured, coriaceous between punctures, subopaque; area superomedia shorter than in female, horseshoe shaped.

ABDOMEN: Gastrocoeli and thyridia distinct, the former slightly longer than wide;

tergites 2-4 fairly strongly and densely punctured.

DISTRIBUTION: Ontario, Quebec, and Maine south at least to New York.

1b. *Melanichneumon disparilis flavidops* Heinrich
Map 108

Melanichneumon disparilis flavidops Heinrich, 1972:203-205, female, male.

Holotype: male, Florida; CGH II. Allotype: female, Georgia; CGH II.

SYSTEMATICS: Chromatically considerably different from the northeastern nominate form; the black color is strongly reduced and the ivory pattern on head, thorax, and legs are strongly increased; color of the abdomen as in the nominate form.

Females are very similar to *heiligbrodtii* populations from Florida, as described further on; they can be distinguished by the following characters:

<i>disparilis flavidops</i>	<i>heiligbrodtii</i>
(1) Basic color of entire body pale orange.	(1) Basic color of entire body chestnut red.
(2) Puncturation of mesoscutum and of anterior tergites markedly finer.	(2) Puncturation of mesoscutum and of anterior tergites dense and rather coarse.
(3) Ivory band around orbits interrupted, or at least reduced to a narrow line on temples.	(3) Ivory band around orbits not interrupted, and at the most slightly narrowed at temples.

Males are not at all similar to *heiligbrodtii* but instead extremely similar in some individuals to the phase of *honestus* (Cresson) with orange-ferruginous basic color of abdomen; most specimens can be distinguished by the combination of the following characters:

<i>disparilis flavidops</i>	<i>honestus</i>
(1) Prescutellar carinae not white (except sometimes in specimens from Louisiana and Arkansas).	(1) Prescutellar carinae always white.
(2) Hypopygium in the majority of specimens ferruginous.	(2) Hypopygium always white.

- (3) The 4th tergite usually without apical ivory pattern (sometimes with apico-lateral marks, exceptionally with an apical ivory band which is medially strongly narrowed).
- (4) Basic color of median lobe of mesoscutum often orange ferruginous.
- (3) The 4th tergite always with apical ivory band.
- (4) Basic color of mesoscutum (probably) always black.

A completely secure identification of *all* specimens of the 2 males is not yet possible.

FEMALE: Head ferruginous, with broad ivory band around eyes (interrupted, or almost interrupted, on temple and on malar space, widened on outer orbits gradually over entire width of cheeks and reaching downward to mandible base); pronotal ridge broadly ivory for the entire length; ivory are also, in addition to the ivory markings of the nominate form: areae posteroexternae more or less distinctly, coxae I and II apically or more extensively, usually dorsal mark on inner side of coxae III, and all 1st trochanters partially or entirely; black pattern reduced to the following: short band on pronotum behind collare, base of prosternum, base of prepectus medially, short and narrow band below subalarum, exterior margin of lateral lobes of mesoscutum, basal furrow of scutellum, basal furrow of propodeum, and axillary troughs.

MALE: Less strongly differentiated from the nominate form than the female by, on the average, greater extent of ivory color on mesopleura and abdomen, and particularly by reduced extent of black, which is partially replaced by ferruginous on pleura, propodeum, legs III, and sometimes also on the mesoscutum; head as in nominate form, except frons sometimes medially not narrowly black but entirely white; basic color of mesoscutum varying from black to medially ferruginous, or (rarely) entirely ferruginous; mesopleura usually predominantly ivory, with the black color reduced to a narrow band below subalarum; propleura more or less extensively ferruginous; femora III and tibiae III often entirely ferruginous, apically not tangibly infuscated; often also the 4th tergite with apico-lateral ivory marks.

DISTRIBUTION (map 108): ARKANSAS. Garland Co.: 4 males, Ouachita State Park,



Map 108. *Melanichneumon disparilis flavidops* Heinrich

11-23-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: 1 female, 1 male, Gainesville, 3-V-1970, 2-VII-1972, G. Heinrich, F. Mead. Clay Co.: 4 males, Gold Head Branch State Park, 27-IV-24-VI-1969-1971, G. Heinrich, D. Radtke. Liberty Co.: 2 males, Torreya State Park, 11-V-1968, G. Heinrich. GEORGIA. Monroe Co.: 2 females, 20 males, Forsyth, 9-IV-8-X-1968-1971, G. Heinrich, F. Naumann. LOUISIANA. Evangeline Co.: 1 female, Bayou Chicot, 18-25-VIII-1971, D. Shaneck; 1 male, Chicot State Park, 26-VI-1971, D. Shaneck. Natchitoches Co.: 1 male, Natchitoches, 11-VI-1971, G. Heinrich; 1 female, Powhatan, 19-VI-1971, G. Heinrich, Webster Co.: 6 females, 4 males, 5-IV-6-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 1 female, 4 males, Starkville, 14-VII-16-X-1970, C. Sartor. Yalobusha Co.: 1 female, 7 males, Water Valley, 28-VII-20-X-1970, M. Horan. TENNESSEE. Henderson Co.: 5 males, Natchez Trail State Park, 2-18-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

2. *Melanichneumon heiligbrodtii* (Cresson)

Map 109, Tables 13-15

Ichneumon heliligbrodtii Cresson, 1874:168, male.

Melanichneumon heiligbrodtii, Townes and Townes, 1951:285, male. Heinrich, 1972:202, female, male (key).

Melanichneumon (Melanichneumon) heiligbrodtii, Heinrich, 1962:597-598, male.

Holotype: male, Texas; ANS. Neallotype: female, Florida, Highlands Co.; CGH II (present designation).

SYSTEMATICS: The chestnut-red basic color of the entire body (distinctly darker than in *disparilis flavidops* Heinrich), combined with coarser puncturation on thorax and abdomen, the absence or strong reduction of ivory markings on mesopleura and mesosternum in males, are the most important differences of *heiligbrodtii* from *disparilis*.

The Florida populations display an unusually high degree of individual variability in their rich ivory and also black pattern, particularly in males (see tables 13-15); only a few of the most melanistic individuals of males agree completely with the holotype of *heiligbrodtii*. The ivory pattern of females agrees in most specimens nearly completely with the ivory pattern of *disparilis flavidops*, while males differ constantly by considerable reduction or absence of ivory markings on mesopleura and mesosternum, and by the black-marked malar space.

This form seems to be replacing *disparilis flavidops* in central and southern Florida, but I do not consider it a subspecies. The case is strikingly analogous to that of *Cratichneumon paratus pseudovinnulus* Heinrich and *Cratichneumon floridensis* Heinrich.

FEMALE: Length 10-13 mm. Ferruginous red, with rich ivory (table 13) and practically without black markings.

FLAGELLUM: Short, lanceolate, strongly widened beyond middle, strongly attenuated toward apex, with 35-38 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 6th square, the widest, seen on the flat side, 3-3.5 times as wide as long. Black, with dorsal white annulus on segments 6 or 7 to 14 or 15, the basal segments apically narrowly, sometimes ventrally more extensively, brownish, exceptionally segments 1-4 extensively ferruginous (1 specimen out of 25); scape ferruginous, usually dorsally at apex slightly infuscated.

HEAD: Temple profile fairly strongly narrowed behind eyes, scarcely curved, cheek profile likewise fairly strongly narrowed toward mandible base; malar space slightly longer than width of mandible base; cheeks in lateral view moderately wide and convex; carina genalis parallel to posterior margin of eyes and straight to carinal junction, which is very close to mandible base; frons coarsely

and densely punctured. Orbits ivory around eyes, the ivory band narrowed on temples, somewhat widened on outer orbits, always interrupted on malar space, usually absent on lower part of facial orbits, sometimes on entire facial orbits.

THORAX: Notauli basally faintly indicated; scutellum slightly raised above postscutellum, dorsally flat, with sharp lateral edges, particularly at base; mesoscutum coarsely and densely punctured, with indistinct, coriaceous undersculpture, glossy. Always ivory are: collare, pronotal ridge apically or entirely, pronotal base partially (rarely for entire length), subalarum, scutellum (medially sometimes faintly orange tinged), the following often ivory: prescutellar carinae and a more or less distinct, small mark on lower, posterior corner of mesopleura; rarely ivory are: small apical mark on metapleura, narrow, short, lateral lines on mesoscutum near tegulae, and a longitudinal mark on upper exterior edge of prepectus; tegulae often white marked.

LEGS: Ferruginous red, without black parts; coxae II and usually also coxae I apically more or less extensively white, as is also in overwhelming majority of specimens a dorsal mark on inner side of coxae III and sometimes a small, apical mark on ventral side of coxae III; 1st trochanters I and II white marked in variable extent: sometimes only with white apical margin, usually more extensively apically or ventrally white, or dorsally (particularly trochanters II) white; 1st trochanters III usually dorso-apically extensively white.

ABDOMEN: Puncturation on the postpetiole, on the average, denser and coarser than in *disparilis*; also the 4th tergite more extensively and slightly coarser punctured than in *disparilis*. Usually tergites 1-3, sometimes only 1 and 2 with ivory latero-apical marks, which on the 3rd tergite form short, narrow bands, removed fairly far from lateral edges of the tergite toward its middle; usually tergites 6 and 7, exceptionally only the 7th, with large apical white mark.

MALE: Length 10-14 mm. Differs from *disparilis* more distinctly than the female in color, as well as in structure, particularly of the flagellum, which is stronger nodose, with relatively shorter segments and with very small, short-oval (instead of bacilliform) tyloids. Ferruginous red, with rich ivory (table 14) and often also with extensive black markings (table 15), both in variable extent.

FLAGELLUM: Rather strongly nodose, with distinct, subapical bristle-ridges from base

on; with 33-37 segments and with very small, short-oval tyloids on about segments 7-17. Black, with dorsal white annulus on segments 10 or 11, or 12 to 16, 17 or 18, ventrally dull brownish; scape ventrally white, surrounded by ferruginous.

HEAD: Malar space less than $1/2$ as long as width of mandible base. Ferruginous red; black are: always antennal cavities and malar space, usually also apical margin of cheeks at mandible base; color of frons, ocellar region, and occiput varying from red to uniformly black; ivory are: face and clypeus uniformly, mandibles basally to predominantly, orbits broadly around eyes (narrowly interrupted at malar space; sometimes black on malar space reduced to a black spot).

THORAX: Scutellum somewhat more raised above postscutellum than in *disparilis*, apically truncate, laterally weakly carinate to beyond middle; mesoscutum coarsely and densely punctured, space between punctures shiny, with extremely fine, coriaceous sculpture; area superomedia usually distinctly wider than long, widened horseshoe shaped, with angular apical carina. Usually ferruginous red, the pronotum with transverse, median black band (laterally usually not reaching the posterior end of propleura), the mesoscutum with black exterior margin; basal furrow of scutellum and of propodeum, the prepectus medially, and the prosternum basally, black; basic color of pronotum, mesoscutum, horizontal part of propodeum, and of prepectus varying to entirely black; usually black also are: a mark or a continuous band on mesopleura below subalarum, often a mark on mesopleura before base of coxae II, areae coxales, and a longitudinal, median mark on apex of area posteromedia; mesosternum and mesopleura, in contrast to *disparilis*, never entirely or predominantly ivory but ferruginous, mesopleura with apical white marks; declivity of propodeum sometimes entirely ivory.

LEGS: Coxae III and femora III never entirely black, at the most the former with black lateral and dorsal spot apically; tarsi III, in contrast to *disparilis*, not pale orange and ivory but dark ferruginous, often even with partial, slight infuscations of segments; tip of femora I and II and anterior side of tibiae I, ivory.

DISTRIBUTION (map 109): Texas, northern Mexico and Florida. (2 males from Georgia and Tennessee). **FLORIDA.** Alachua Co.: 1 male, 13-IV-1956, (CHT). Highland Co.: 18 females, 66 males, Archbold Biological Station, V-1968, G. Heinrich; 3



Map 109. *Melanichneumon heiligbrodtii* (Cresson)

females, 6 males, Highlands Hammock State Park, 31-VIII-30-IX-1969, G. Heinrich, R. Miller. Lee Co.: 7 females, 17 males, Ft. Myers, III-V, G. Heinrich, D. Radtke. Pinellas Co.: 3 males, Tarpon Springs, 20-III. **GEORGIA.** Clarke Co.: 1 male, Athens, 11-15-V-1969, G. Heinrich. **TENNESSEE.** Henderson Co.: 1 male, Natchez Trail State Park, 2-7-VI-1972, G. Heinrich. All specimens in CGH II unless otherwise noted.

Table 13. Distribution of ivory on 25 females of *Melanichneumon heiligbrodtii*

No. specimens	Distribution of ivory
	orbits around eyes, narrowed at temples:
19	a. except malar space and lower facial orbits only
6	b. except entire facial orbits
16	mandible base narrowly, more or less distinctly
25	collare
25	subalarum
25	postscutellum
18	scutellum entirely
7	scutellum except reddish-tinged median part
20	superior part of pronotal base

(continued next page)

Table 13 continued

5	pronotal base for entire length	5	orbits broadly around eyes, except only a black spot on malar space
13	pronotal ridge apically more or less extensively	18	mandible base more or less restrictedly
12	pronotal ridge for its entire length	6	mandibles predominantly
17	marks on prescutellar carinae	25	collare
1	longitudinal median lines on mesoscutum	25	pronotal ridge
1	lateral lines on mesoscutum at tegulae	25	pronotal base
22	areae posteroexternae entirely or partially	25	subalarum
19	mark on lower posterior corner of mesopleura more or less distinctly, or at least with indication of 1	25	scutellum
2	small apical mark on metapleura	25	postscutellum
1	lateral marks on prepectus	25	prescutellar carinae
18	apico-lateral marks on tergites 1-3	25	areae posteroexternae
7	apico-lateral marks on tergites 1-2 only	23	2 longitudinal median lines on mesoscutum
23	apical marks on tergites 6 and 7	10	short lateral lines on mesoscutum at tegulae
2	apical marks on the 7th tergite only	22	marks on tegulae
25	coxae II apically more or less extensively	24	mark on upper part of carinal triangle
23	coxae I apically more or less extensively	24	line on exterior upper part of prepectus
23	dorsal mark on inner side of coxae III	21	small mark on posterior lower corner of mesopleura
5	also small ventral mark apically on inner side of coxae III	20	small apical mark on metapleura
16	trochanters I and/or II dorsally and apically more or less extensively	18	mark or line on sternauli
9	trochanters I and II at the most with narrow apical margin	5	2 longitudinal apical marks on mesosternum on sides of mesolcus
22	trochanters III dorso-apically extensively	18	apex of prosternum restrictedly
		3	prosternum predominantly
		5	area posteromedia restrictedly
		14	area posteromedia entirely or predominantly
		25	apical band on postpetiole
		23	continuous apical band on 2nd tergite
		2	medially interrupted apical band on 2nd tergite
		23	continuous apical band on 3rd tergite
		2	medially interrupted apical band on 3rd tergite
		2	apical band on 4th tergite
		12	2 separated transverse apical marks on 4th tergite
		18	distinct apical mark or median band on 6th tergite
		4	very small apical spot on 6th tergite
		3	no mark on 6th tergite
		25	conspicuous apical mark on 7th tergite

Table 14. Distribution of ivory on 25 males of *Melanichneumon heiligbrodtii*

No. specimens	Distribution of ivory
25	face and clypeus entirely
20	orbits broadly around eyes, except only malar space and apical margin of cheeks at mandible base

25	coxae I and II predominantly or entirely
25	dorsal mark on inner side of coxae III
11	restricted mark or spot on apex of ventral side of coxae III
10	conspicuous longitudinal mark on apex of ventral side of coxae III
4	entire length of ventral side of coxae III
10	narrow apical margin of 1st trochanters I and II
12	1st trochanters I and/or II more conspicuously
3	1st trochanters I and II predominantly
18	1st trochanters III apically extensively
6	1st trochanters III predominantly
25	tip of femora I and II on anterior side
25	tibiae I on anterior side

Table 15. Distribution of black on 25 males of *Melanichneumon heiligbrodtii*

No. specimens	Distribution of black
7	only antennal cavities more or less extensively
6	in addition also frons below ocellar region
12	antennal cavities, frons, ocellar region, and occiput entirely or predominantly
18	pronotum with transverse band not reaching laterally to mesopleura
3	pronotum with transverse band reaching laterally to mesopleura
3	pronotum uniformly (except white marks)
20	only outer margin of mesoscutum
3	outer lobes of mesoscutum more extensively
1	outer lobes of mesoscutum entirely
2	also median lobe apically more or less extensively
1	basic color of entire mesoscutum

4	only central part of prepectus
11	prepectus predominantly
10	prepectus entirely, except white markings
20	longitudinal band or conspicuous mark below subalarum
25	basal furrow of scutellum and lateral slopes of scutella
19	base and/or lateral margins of prosternum more or less extensively
13	median, apical, longitudinal band on area posteromedia
	horizontal part of propodeum:
4	a. except areae dentiparae
2	b. including areae dentiparae
10	apical mark on exterior side of coxae III
6	in addition apical mark on dorsal side of coxae III
5	mark on mesopleura before base of coxae III
6	base of coxae III on ventral side
6	areae coxales
2	2nd tergite with basal band
2	tergites 1-2 with basal bands
2	tergites 1-4 with basal bands
1	tergites 1-5 with basal bands

**3a. *Melanichneumon honestus*
honestus (Cresson)
Map 110**

Ichneumon honestus Cresson, 1867:310, male.

Melanichneumon honestus, Townes and Townes, 1951:285, male.

Melanichneumon (Melanichneumon) honestus Heinrich, 1962:592-594, male, female.

Holotype: male, West Virginia; ANS. Neallotype: female, South Carolina; CGH II.

SYSTEMATICS: Females of this species are chromatically well distinguished from the 2 preceding species and from all other known sympatric species by the absence of an apical white mark on the 7th tergite and by the extensively ivory mesopleura and

mesosternum. Characteristic for *honestus* are in addition the absence of infuscations on the apices of femora and tibiae III and the constantly white prescutellar carinae and white, median, longitudinal lines on mesoscutum. The basic color of mesoscutum varies from medially more or less extensively red (in northern parts of the range) to completely black (in the most southern populations).

In males the basic color of mesoscutum is always entirely black. Males share with females the white prescutellar carinae and the 2 longitudinal median lines on mesoscutum, but display in addition 2 short lateral white lines near tegulae. As in females, the mesosternum and mesopleura are predominantly ivory. In contrast to female, the ivory pattern on the abdomen includes a conspicuous mark on 7th tergite. Apices of femora and tibiae III, as in female, not infuscated.

In both sexes scutellum with fairly distinct, slightly raised lateral carinae to beyond middle.

Throughout the southeastern states a melanistic phase occurs, together with the typical, erythristic specimens: females with completely black basic color of the mesoscutum and males with black basic color of abdomen and ivory apical bands on all tergites; the melanistic males particularly, are strikingly different in appearance from typical males with entirely orange-ferruginous basic color of abdomen. However, there can be no doubt that both phases represent a single species as intergrades are frequent and the structure is congruent. In Florida the melanistic phase becomes completely predominant (subspecies *milleri* Heinrich).

The erythristic phase of males often is extremely similar to *disparilis flavidops* Heinrich and difficult to distinguish from the latter (see treatment of preceding species).

FEMALE: Length 9-11 mm. Head orange, the following ivory: mandibles, orbits broadly around eyes (except malar space), sometimes also face medially and clypeus laterally; ocellar and occipital regions usually infuscated or black, sometimes also middle of frons and antennal cavities; thorax orange, at least the lateral lobes of mesoscutum extensively or entirely; black are also: middle of pronotum, base of prosternum, band below subalarum, base of prepectus, basal furrow of scutellum and of propodeum, and axillary troughs; propleura, and horizontal part of propodeum pre-

dominantly or entirely orange ferruginous; the following ivory: collare, pronotal ridge and base broadly, subalarum, sometimes tegulae in part, 2 longitudinal, median stripes on mesoscutum, 2 short, lateral stripes next to tegulae, prescutellar carinae, scutellum, postscutellum, areae postero-externae, sometimes apical marks on areae metapleurales, broad, diagonal, ill-defined crossband on mesopleura, prosternum, often mesosternum more or less extensively, and carinal triangle; legs orange, all trochanters and the coxae I and II whitish; coxae III dorsally on interior side white, usually with dorso-apical black mark, whitish on ventral side, sometimes with black patch on exterior side; abdomen orange, tergites 1-3 with triangular, latero-apical, ivory marks, which are sometimes confluent, forming continuous, apical bands; flagellum black, with almost complete, or with complete, white annulus on segments 6-14 or 15 or 16; scape ventrally ferruginous, basal segments usually apically brownish.

FLAGELLUM: Lanceolate, considerably widened and ventrally flattened beyond middle, slightly longer and more strongly attenuated toward apex than in *disparilis*; with 35-38 segments, the 1st less than twice as long as apically wide, in lateral view the 7th approximately square, the widest, on the flat side, about 3.5 times as wide as long.

HEAD: Nearly as in *disparilis*, but in dorsal view slightly wider, the temple profile not quite as strongly narrowed behind eyes; cheek profile also slightly less narrowed toward mandible base; malar space nearly as long as width of mandible base.

THORAX: As in *disparilis*, however, the scutellum flattened and with slightly raised lateral carinae to beyond middle; area posteromedia and horizontal part of propodeum medially of about equal length; carination of propodeum as in *disparilis*.

LEGS: Femora III comparatively slightly thicker than in *disparilis*; coxae III ventrally very densely and somewhat finer punctured than in *disparilis*.

ABDOMEN: Generally as in *disparilis*; median field of postpetiole, on the average, more distinct and more densely punctured; gastrocoeli and thyridia more distinct.

MALE: Length 12 mm. Head ivory, the following black: antennal cavities, middle of frons restrictedly, ocellar and occipital regions; thorax black and ivory, usually with some orange parts on propodeum; the following ivory: collare, pronotal ridge and base broadly, subalarum, tegulae in part, 2

longitudinal, median stripes on mesoscutum next to tegulae, prescutellar carinae, scutellum, postscutellum, carinal triangle, usually carinae around area superomedia partially, areae posteroexternae, upper part to all of area posteromedia, areae dentiparae, areae spiraculiferae and metapleurales apically to predominantly, prosternum apically to predominantly, mesosternum, exterior belt of prepectus more or less extensively, mesopleura except upper 1/3 or less; basic color of mesoscutum and pronotum and the upper part of mesopleura always black; basic color of horizontal part of propodeum and of basal parts of areae spiraculiferae and metapleurales varying from orange to black; legs orange, the following ivory: all trochanters, coxae I and II, ventral side of coxae III and the inner part of their dorsal side; exterior side of coxae III and basal part of interior side varying from orange to black; always at least an apico-dorsal black mark on coxae III; all tarsi predominantly ivory; apices of femora III and of tibiae III never black, exceptionally slightly infuscated; color of abdomen orange, always ivory are: conspicuous, apical bands on tergites 1-4, large apical mark on 7th tergite, the hypopygium, and the lateral surface of petiole; flagellum black, ventrally brown, with complete, white annulus on segments 11 or 12 to 20 or 21, or 24.

FLAGELLUM: With 35-36 segments and with unobtrusive, short, and narrow tyloids on segments 7-15 or 16, the basal tyloids close to bacilliform, the apical tyloids short oval, the 1st and last punctiform.

HEAD: Malar space not quite as long as width of mandible base.

THORAX: Mesoscutum stronger convex and longer than in female, densely punctured, finely coriaceous between punctures, subopaque; scutellum somewhat raised above postscutellum, laterally carinate; area superomedia about as wide or somewhat wider than long, approximately horseshoe shaped.

DISTRIBUTION (map 110): From Maryland and West Virginia south to northern Florida, west to Louisiana and Arkansas. ARKANSAS. Garland Co.: 1 female, 3 males, Ouachita State Park, 9-26-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: 1 male, Gainesville, 3-V, G. Heinrich. Clay Co.: 1 female, 3 males, Gold Head Branch State Park, 25-29-IV-1971, G. Heinrich. GEORGIA. Clarke Co.: 1 female, 2 males, Athens, 4-VII-31-VIII-1969-1970, H. Hermann. Monroe Co.: 10 females, 15 males, Forsyth. 20-IV-30-IX-



Map 110. *Melanichneumon honestus honestus* (Cresson)

1970-1971, G. Heinrich, F. Naumann. LOUISIANA. Avoyelles Co.: 8 males, Eola, 26-III-7-VII-1972, D. Shaneck, Evangeline Co.: 8 females, 8 males, Bayou Chicot, 11-VIII-13-X-1971, 13-22-III-1972, D. Shaneck. Webster Co.: 5 females, 7 males, Bistineau State Park, 16-IV-6-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Lafayette Co.: 2 females, Water Valley, 4-12-VI-1971, M. Horan. Oktibbeha Co.: 5 females, 5 males, Starkville, 1-V-24-IX-1971, C. Sartor. Yalobusha Co.: 2 females, 9 males, Water Valley, 22-IV-9-X-1971, M. Horan. NORTH CAROLINA. Rowan Co.: Salisbury, 3 males, 8-V-1970, G. Heinrich. SOUTH CAROLINA. Greenville Co.: Tigerville, 1 female, 1 male, 8-V-1944, H. and M. Townes. TENNESSEE. Henderson Co.: 3 females, 6 males, Natchez Trail State Park, 2-26-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

3b. *Melanichneumon honestus milleri* Heinrich Plate 5, Map 111

Melanichneumon honestus milleri Heinrich, 1972:205-207, female, male.

Holotype: female, Florida, Highlands Co.; CGH II. Allotype: male, Florida, Highlands Co.; CGH II.

FEMALE: Basic color of entire mesoscutum and entire or nearly entire pronotum and horizontal part of propodeum black; basic color of 1st tergite, sometimes also of 2nd tergite extensively black.

MALE: Length 11-13 mm. First tergite black, with broad, apical, ivory band; tergites 2-4 predominantly black (the 2nd tergite except gastrocoeli), ivory beyond black basal section; tergites 5 and 6 ferruginous, the 5th tergite basally extensively, the 6th basally not or only restrictedly, black; 7th tergite predominantly white.

DISTRIBUTION (map 111): This seems to be the only form occurring in Florida. Georgia, Mississippi, and Louisiana are inhabited by mixed populations containing both sexes of subspecies *milleri* and of subspecies *honestus*. In the same area also occur frequently individuals with intermediate characters between the 2 subspecies.

All records except those for Central Florida, are listed under *honestus honestus*. **FLORIDA.** Highlands Co.: Highlands Hammock State Park, 1 male, 27-IV-1968, G. Heinrich; 3 females, 3-IX-28-XI-1969, R. Miller. All specimens in CGH II.

4. *Melanichneumon mystificans*

Heinrich

Map 112

Melanichneumon mystificans Heinrich, 1972:207-208, female, male.

Holotype: male, Georgia, Forsyth; CGH II. Allotype: female, (tentative), Georgia, Forsyth; CGH II.

SYSTEMATICS: All 8 males of the type series are distinguished chromatically by the combination of the following characters: (1) tergites 1-4 or 5 black, with apical ivory bands, tergites 2-4 or 5 chestnut red between black and ivory sections; (2) mesoscutum black, prescutellar carinae, 2 long, longitudinal, median lines and 2 short, lateral lines, ivory; (3) apices of femora III black or blackish, usually also apex of tibiae III slightly infuscated; (4) mesosternum entirely ivory, mesopleura predominantly (except only the black upper 1/3). Characters (1) and (2) agree with the male of *heiligbrodtii* and suggest specific identity with the latter; characters (3) and (4), however, do not agree with any of the 95 males of *heiligbrodtii* recorded from Florida, nor do they agree with the 2 males of *heiligbrodtii* recorded from Georgia and Tennessee. Considering the uniformity of all 8 males of *mystificans* it must be assumed that they represent a distinct form, either a species or a subspecies of *heiligbrodtii*; with regard to the distributional pattern of *heiligbrodtii*, the former hypothesis appears to have at present a greater likelihood.



Map 111. *Melanichneumon honestus milleri* Heinrich

The female collected at the type locality and tentatively associated with the holotype shares with *heiligbrodtii* the broad ivory bands on orbits (including the temple region), the ferruginous basic color of mesoscutum, and the apical white marks on tergites 6 and 7; it is distinguished from *heiligbrodtii* by wider, more curved outline of the temple profile, by presence of 4 longitudinal ivory lines on mesoscutum and of continuous, apical, ivory bands on tergites 1-3.

MALE: Length 11-12 mm. Head ivory, the following black: antennal cavities, middle of frons, ocellar and occipital regions; thorax black and white; white are: collare, pronotal ridge and base, 2 long, median, longitudinal lines on mesoscutum and 2 short, lateral lines on mesoscutum, prescutellar carinae, scutellum, postscutellum, subalarum, tegulae predominantly, prosternum except base, mesosternum entirely or predominantly, mesopleura (except about upper 1/3 black), declivity of propodeum, ends of areae dentiparae and of areae spiraculiferae, areae metapleurales apically or predominantly, and carinal triangle; 1st tergite black with apical ivory band, often red between ivory band and black petiolus; tergites 2-4 or 5 basally extensively black, 2-4 with apical ivory bands, chestnut red between the 2 colors; the following tergites chestnut-red, the 7th tergite, rarely also the 6th, with apical white mark; legs orange ferruginous, apices of femora III black, usually also apices of

tibiae III slightly infuscated; all trochanters and all coxae ivory, exterior side of coxae III black (extensively or entirely); base of 1st trochanters III dorsally black; the tarsi I and II and segments 3-5 of tarsi III, and interior side of tibiae I and II, yellowish tinged; flagellum black, ventrally brown, with white annulus on segments 10 or 11 to usually 16, sometimes 18; scape ventrally ivory.

FLAGELLUM: With 33-34 segments, and with distinct, short-oval, orange-colored tyloids on segments 7-17 (usually also a punctiform tyloid on the 6th and the 18th segment recognizable).

HEAD: Malar space less than $1/2$ as long as width of mandible base; temple profile distinctly narrowed behind eyes, slightly curved.

THORAX: Mesoscutum densely punctured, finely coriaceous between punctures, subopaque; scutellum somewhat raised above postscutellum, with sharp lateral edges to beyond middle; area superomedia abbreviated, 2-4 times as wide as medially long, halfmoon to quartermoon shaped, the area posteromedia angularly projecting into the area superomedia.

ABDOMEN: Comparatively narrow; tergites 2-4 densely and rather coarsely punctured, the 5th tergite more finely punctured than in the Florida populations of *heiligbrodtii*.

FEMALE (tentative): Length 11 mm. Pale orange, the face, clypeus, mesosternum, and mesopleura ivory tinged; the following ivory: broad band all around orbits, collare, pronotal ridge and base, 2 long, longitudinal, median and 2 short, lateral lines on mesoscutum, prescutellar carinae, subalarum, scutellum, postscutellum, areae posterexternae, apical parts of areae metapleurales, continuous apical bands on tergites 1-3, small, apical spot on 6th tergite, large, apical mark on 7th tergite, coxae I and II almost entirely, large, dorsal mark on interior side of coxae III and their ventral side, all trochanters partially; the following black: a short band on each side on base of pronotum, exterior margin of mesoscutum narrowly, mark below subalarum, basal furrow of propodeum narrowly; flagellum black, with dorsal white annulus on segments 7-15; scape ventrally ferruginous.

FLAGELLUM: Lanceolate, strongly widened beyond middle, long and sharply attenuated toward apex, with 40 segments, the 1st less than twice as long as apically wide, in lateral view the 6th segment square, the

widest on the flat side more than 3 times as wide as long.

HEAD: Temple profile less narrowed behind eyes than in *heiligbrodtii* (Florida populations) and also less than in *disparilis*.

THORAX: Mesoscutum densely punctured, finely coriaceous between punctures, slightly shiny; scutellum with sharp lateral edges to about middle; area superomedia slightly longer than wide, forming a Roman arch; all pleura fairly finely punctured, smooth and glossy between punctures.

LEGS: Coxae III densely and finely punctured on ventral side.

ABDOMEN: Postpetiole densely punctured, with ill-defined median field; tergites 2-3 densely and moderately finely punctured, the 4th tergite finely and toward apex sparsely punctured.

DISTRIBUTION (map 112): Known only from Georgia, Monroe Co.: Forsyth, 8 males, V, VII-VIII-1970; 1 female, 10-VI-1970, F. Naumann (CGH II).

5. *Melanichneumon margaritae*

Heinrich
Map 113

Melanichneumon margaritae Heinrich, 1973:464-465, female, male.

Holotype: female, Tennessee, Henderson Co.; CGH II. Allotype: male, Tennessee, Henderson Co.; CGH II.



Map 112. *Melanichneumon mystificans* Heinrich

SYSTEMATICS: The fact that both sexes were caught simultaneously at the same place, and that they correspond well in a number of characters suggests that their association is, in all probability, correct. We have here the 1st known case of a strongly sexually dichromatic species of the genus *Melanichneumon*, the basic color of females being red, of males black. The Nearctic ichneumonine fauna offers many examples of parallel sexual dichromatism, particularly in the genera *Ctenichneumon* Thomson and *Tricholabus* Thomson.

Females of this species are well distinguished by the structure of flagellum; the flagellum is longer, less widened beyond middle, and apically longer and stronger attenuated and pointed than in all the preceding species. Males differ from all other southeastern species by the black basic color of entire body and legs, with rich white markings including white bands on all tergites.

FEMALE: Length 11 mm. Bright ferruginous red, with rich ivory and a few black markings; the following ivory: orbits broadly all around eyes (interrupted narrowly only on malar space), extreme base of mandibles collare, pronotal ridge and base, subalarum mark on tegulae, 2 (not very distinct) longitudinal, median lines on mesoscutum, 2 lateral lines on mesoscutum, marks on prescutellar carinae, scutellum, postscutellum, areae posteroexternae, a fairly large mark on lower, apical part of mesopleuron, apical mark on area metapleurale, coxae I except basally, coxae II apically, large mark on interior part of dorsal side of coxae III, percurrent (or on 2nd and 3rd tergite medially interrupted), narrow, apical bands on tergites 1-3, conspicuous apical marks on tergites 6 and 7, and sometimes a narrow and short band on each side of apical margin of the 4th tergite; the following black: base of prosternum, prepectus (except ferruginous exterior belt all around), propleura extensively, band below subalarum, narrow exterior margin of mesoscutum all around, basal furrow of scutellum, axillary troughs, basal furrow of propodeum narrowly all around, and base of petiole; in 1 specimen lateral lobes of mesoscutum infuscated; flagellum black with complete white annulus on segments 6 or 7 to 16, segments before annulus apically narrowly brownish; scape ferruginous, dorsally partially black.

FLAGELLUM: Somewhat longer and more slender than in all preceding species, less strongly widened beyond middle and more

strongly attenuated toward apex, with 41-43 segments, the 1st about twice as long as apically wide, in lateral view the 8th or 9th square, the widest nearly 2.5 times as wide as long on the flat side, about 9 apical segments not wider than long.

HEAD: Temple profile moderately narrowed behind eyes, slightly curved; malar space about as long as width of mandible base.

THORAX: Scutellum with sharp lateral edges to about middle; area supermedia slightly longer than wide, gradually narrowed toward area basalis, approaching the shape of a Roman arch.

LEGS: Femora III fairly thick; coxae III ventrally densely punctured, finely coriaceous between punctures.

ABDOMEN: Postpetiole without indication of median field, densely and regularly punctured all over; tergites 2 and 3 likewise punctured, finely coriaceous between punctures; the 4th tergite finely and indistinctly punctured to beyond middle; ovipositor somewhat projecting.

MALE: Length 10-11 mm. Black, with very rich white markings and without ferruginous parts, except sometimes anterior side of femora II ferruginous toward apex; the following are white: the head (except black antennal cavities, broad middle of frons, ocellar and occipital regions, the latter together with band along carina genalis down nearly to mandible base, and always black malar space), collare, pronotal ridge and base, subalarum, mark on tegulae, 2 longitudinal median stripes on mesoscutum, 2 short, lateral stripes on mesoscutum, mark on prescutellar carinae, scutellum, postscutellum, apex of prosternum, more or less extensive band on upper exterior belt of prepectus, sometimes an irregular mark adjacent to the latter on mesopleura, sometimes a conspicuous mark on lower, apical part of mesopleura, instead of that mark in the majority of specimens a broad, continuous band on lower 1/2 of mesopleura, apical mark on metapleura, often a short stripe on sternauli on mesosternum, areae posteroexternae, mark on carinal triangle, regular, apical bands on tergites 1-5, a laterally abbreviated, apical band or mark on the 6th tergite, longitudinal, apical mark on 7th tergite, coxae I, coxae II except basally, large mark on interior dorsal side of coxae III, usually a longitudinal band on ventral side of coxae III, apical margin of 1st trochanters I, femora I and II apically on anterior side, ventral side of tibiae I and II, and sometimes

stripe on ventral side of tibiae III beyond base; flagellum black, with not quite complete white annulus on segments 11-18 or 19; scape ventrally white.

FLAGELLUM: With 38-41 segments and with very short and small, ivory-colored, narrowly-oval tyloids on segments 9 or 10 to 17 or 18, the longest covering only about the median $1/3$ of the length of the segments.

HEAD: Malar space about $1/2$ as long as width of mandible base; temple profile distinctly narrowed behind eyes, barely curved; frons densely punctured and coriaceous, opaque.

THORAX: Scutellum slightly raised above postscutellum, with sharp lateral edges at the base; area posteromedia twice as long as horizontal part of propodeum medially; area superomedia considerably wider than long, halfmoon to quartermoon shaped, the apical bordering carina projecting into the area superomedia in a steep curve or angularly.

ABDOMEN: Tergites 1-3 densely and coarsely punctured all over; the 4th tergite more finely and toward apex less densely punctured, the 5th tergite finely punctured to beyond middle.

DISTRIBUTION (map 113): Tennessee, Arkansas and Missouri. ARKANSAS. Crawford Co.: 5 males, Mountainberg, 10-13-VI-1971, P. Rush (CHT). MISSOURI. Wayne Co.: 2 females, 7 males, Natchez Trail State Park, 1-26-VI-1972 and 22-26-VI-1972 (holotype), G. Heinrich, D. Shaneck (CGH II).



Map 113. *Melanichneumon margaritae*, n. sp.

6. *Melanichneumon leviculus* (Cresson) Map 114

Ichneumon leviculus Cresson, 1877:170, male.

Melanichneumon leviculus, Townes and Townes, 1951:285, male.

Melanichneumon (Melanichneumon) leviculus, Heinrich, 1962:599-600, male, female.

Holotype: male, New York; ANS. Neallotype: female, Maine; CGH II.

SYSTEMATICS: This species represents a small group of mainly northeastern forms which differ from typical *Melanichneumon* species chromatically by complete absence of white or ivory bands or marks on anterior tergites and on the mesoscutum.

From all preceding species the females of *leviculus* are distinguished by: (1) presence of a distinct scopa on coxae III, (2) black basic color of the entire thorax (without white markings on mesoscutum) combined with uniformly red color of tergites 1-5. Males are recognizable by absence of white marks on abdomen (except a narrow apical ivory band on postpetiole, which is red, except extensively black 1st and the last 2 tergites.

FEMALE: Length 8-10 mm. Head and thorax black; the following white: marks on vertical orbits, usually frontal orbits narrowly, lateral marks on clypeus, sometimes narrow stripe on outer orbits below temple region, usually a small mark on upper facial orbits and a small mark on lower, exterior corner of face, collare, apex of pronotal ridge more or less extensively, apex of scutellum, postscutellum, and subalarum; rarely pronotal ridge almost entirely white or entirely black; mandibles and usually clypeus medially ferruginous; abdomen red, tergites 6 and 7 or at least the 7th, black, the petiole sometimes blackish infuscated; always tergites 6 and 7 with apical white marks; basic color of all coxae, trochanters, and femora varying individually from black to ferruginous; basic color of all tibiae and tarsi, and anterior side of femora I and II ferruginous or brownish, the apex of tibiae III and of the tarsi III more or less extensively blackish infuscated; flagellum black, with nearly complete white annulus on segments 7-13 or 15; scape black.

FLAGELLUM: Lanceolate, ventrally flattened and strongly widened beyond middle, distinctly attenuated toward apex, with 31-35 segments, the 1st about 1.3 times as long as apically wide, in lateral view the 4th square, the widest nearly 2.5 times as wide as long.

HEAD: Temple profile moderately narrowed behind eyes, slightly curved; cheek profile distinctly narrowed toward mandible base, almost straight; malar space somewhat shorter than width of mandible base.

THORAX: Scutellum slightly convex, with sharp lateral edges at the base only; area posteromedia slightly longer than horizontal part medially; area superomedia as long, or slightly longer than wide, narrowed from costulae toward area basalis, approximately hexagonal.

LEGS: Femora III in lateral view rather stout and only about 3.5 times as long as medially wide; coxae III on ventral side finely and moderately densely punctured, with distinct scopa.

ABDOMEN: Median field of postpetiole indicated, but not clearly defined; postpetiole and tergites 2-3 moderately coarsely and moderately densely punctured, glossy between punctures; the 4th tergite with more shallow and finer puncturation.

MALE: Length 10-11 mm. Head and thorax black, with white but without red markings; the following are white: face and clypeus, except percurrent, longitudinal, median black band (rarely interrupted or absent on clypeus), orbits around eyes (broadly interrupted on temples, very narrowly interrupted on malar space), collare, pronotal ridge broadly, subalarum, mark on tegulae, scutellum (except base), postscutellum, 2 marks on propodeum (varying considerably in size from small spots to extensive marks, covering entire areae posteroexternae together with most of areae dentiparae and with apical part of areae spiraculiferae), rarely also irregular marks on mesopleura and pronotal base toward apex; abdomen red, the following black: 1st tergite predominantly, 7th tergite, and usually 6th tergite partially, postpetiole with latero-apical ivory marks or ivory apical band; basic color of coxae, trochanters, and femora varying from black to ferruginous, of tibiae and tarsi ferruginous; the following ivory: coxae I and II more or less extensively, except basally, sometimes mark on dorsal interior side of coxae III and apical mark on ventral side of coxae III, anterior side of tibiae and tarsi I and II, and sometimes 1st trochanters I and II partially; apices of tibiae III and (in red variations) of femora III, and tarsi III always black or blackish infuscated; flagellum black, ventrally brown, with complete white annulus on segments 13 or 14 to 21 or 22 or even to 24; scape ventrally ivory.

FLAGELLUM: With 34-37 segments and with elongate-oval tyloids on segments 4 or 5 to 14 or 15, the longest, on segments 9-13, almost reaching from bases to apices of segments.

HEAD: Temple profile barely narrowed behind eyes, with curved outline; malar space subobsolete.

THORAX: Mesoscutum densely, the median lobe very densely punctured; anterior 1/3 of notauli distinct; scutellum slightly raised above postscutellum and moderately convex, with sharp lateral edges at base, apically truncate, with rounded slope; area superomedia as wide as long or slightly wider than long.

LEGS: Femora III fairly stout; coxae III ventrally densely punctured, shiny between punctures.

ABDOMEN: Median field of postpetiole fairly distinct; tergites 1-5 fairly densely and coarsely punctured, glossy between punctures.

DISTRIBUTION (map 114): Quebec and Ontario south to North Carolina, west to Arkansas. ARKANSAS. Garland Co.: 2 males, Ouachita State Park, 16-27-V-1972, G. Heinrich, D. Shaneck (CGH II).

7. *Melanichneumon complicatus*, new species
Map 115

SYSTEMATICS: The holotype shows a rather strong similarity in color with the



Map 114. *Melanichneumon levicutus* (Cresson)

sympatric *disparilis flavidops* Heinrich; it differs markedly from the latter species in the structure of head and flagellum, and even more considerably in the sculpture of mesoscutum and of tergites 1-4; it also differs slightly in color by absence of apical, ivory marks or bands on tergites 2 and 3.

The following are the most important differences from *disparilis flavidops*: (1) temple profile less narrowed behind eyes and stronger curved; (2) mesoscutum, particularly the lateral lobes, less densely punctured, not finely coriaceous between punctures but glossy, the mesoscutum therefore not sub-opaque; (3) flagellum less widened beyond middle; (4) tergites 1-3 finer and markedly more sparsely punctured, not finely coriaceous between punctures but glossy; (5) tergites 2 and 3 uniformly pale orange, without apical bands or apico-lateral marks.

If the stronger head structure would represent the only tangible difference from *disparilis*, I would suspect that the type specimen is a freak, as occasionally occurs; however, the existence of several additional differences, also in the sculpture and in color, strongly suggests specific identity; nevertheless, the species needs further observation and confirmation.

FEMALE: Length 9 mm. Pale orange, mesosternum and most of mesopleura and metapleura faintly ivory tinged; the following ivory: orbits around eyes (interrupted on malar space and on temples), collare, pronotal ridge, subalarum, scutellum, post-scutellum, areae posteroexternae, indistinctly apical margin of postpetiole medially, apical marks on tergites 6 and 7, and coxae and 1st trochanters I and II; the following black: small spot below subalarum and very narrowly the exterior margin of mesoscutum; flagellum black, with dorsal white annulus on segments 6 (apex) to 14, segments before annulus apically on dorsal side, extensively on ventral side, brownish; scape ferruginous, partially blackish on dorsal side.

FLAGELLUM: Sublanceolate: distinctly, though not very strongly widened beyond middle, gradually and moderately attenuated toward apex; with 34 segments, the 1st about 1.5 times as long as apically wide, in lateral view the 6th square, the widest on the flat side about twice as wide as long.

HEAD: Temple profile moderately narrowed behind eyes, distinctly curved; cheek profile moderately narrowed toward mandible base, straight; malar space about as long as width of mandible base; clypeus approximately 4 times as wide as medially long.

THORAX: Mesoscutum slightly longer than medially wide, moderately densely punctured, not coriaceous and opaque but smooth and glossy between punctures; scutellum with sharp, slightly prominent lateral edges nearly to the apex; area superomedia slightly longer than wide, nearly semioval; costulae oblique.

LEGS: Coxae III ventrally densely punctured, gradually narrowed toward apex and fairly densely pilose apically on inner side, the hair, however, not forming a distinct scopa; femora III moderately slender.

WINGS: Areolet pentagonal, the intercubiti not strongly narrowed in front; nervulus interstitial.

ABDOMEN: Tergites 1-3 and the 4th tergite to beyond middle not very densely punctured and not coriaceous between punctures but smooth and shiny (in contrast to *disparilis flavidops*); gastrocoeli triangular, fairly distinct.

MALE: (A single, unidentifiable male from the same locality as the holotype corresponds with the latter in the structure of scutellum (with prominent lateral edges), in the wing venation, and in the sculpture of mesoscutum; it may be associated with the holotype, but, this is not more than a guess and therefore the male has not been designated as allotype and will be described only briefly.) Length 11 mm.

Head ivory, antennal cavities, broad middle of frons, ocellar and occipital regions, black; thorax black, the mesoscutum with 2 short, apically convergent, median, ivory lines; also ivory are: collare, pronotal ridge and base, subalarum, mark on tegulae, scutellum, postscutellum, carinal triangle, areae posteroexternae together with apical 1/2 of areae dentiparae and of areae spiraculiferae, posternum except base, exterior belt of prepectus, mesosternum, mesopleura (except more than upper 1/3 black and except black mark in front of coxae II), coxae and trochanters I and II, coxae III dorsally on interior 1/2 and ventrally at apex; base of mesopleura and of areae dentiparae orange ferruginous; abdomen orange, tergites 1-4 with percurrent, apical, ivory bands; legs orange, including basic color of coxae III; tips of femora III and of tibiae III blackish infuscated, coxae III with black dorsal mark on exterior side; tibiae III ivory tinged at the extreme base; flagellum with dorsal white annulus, ventrally brownish.

Holotype: female, Louisiana, Webster Co., Bistineau State Park, near Doyline, 21-25-IV-1972, G. Heinrich, D. Shaneck (CGH II).

DISTRIBUTION (map 115): Known from Louisiana only from the holotype female and questionable male with the same data except collected 16-18-IV-1972 (CGH II).

29. Genus *Rictichneumon* Heinrich, new status

Melanichneumon subgenus *Rictichneumon* Heinrich, 1961:17 and 1962:628, 666.

Type species: *Ichneumon residuus* Say.

SYSTEMATICS: The type of carination of the propodeum and the punctured sculpture of the postpetiole place this genus clearly into the complex *Melanichneumon* group; it seems most closely related to the genus *Barichneumon* Thomson, having the small, sexually not dimorphic gastrocoeli, and the short and stout flagellum and legs. Uniquely distinguished from *Barichneumon* by the following characters of females: (1) Clypeus extremely widened, in the type species more than 6 times as wide as medially long. (2) Tibiae covered by stiff, bristle-like spines; tibiae stout, gradually widened from base to apex, the apical margin of tibiae III more or less projecting, in the type species the projecting apical rim bent upward. (The structure of tibiae therefore shows a distinct similarity to the genus *Glyphicnemis* Foerster of the Cryptinae.) (3) Mandibles smooth, long, and strong, gradually tapering toward

the pointed apex, the subapical tooth rudimentary (Heinrich, 1962:666, fig. 22, 23). None of these 3 decisive characters is present or fully developed in males; the males can be recognized only by their wider and shorter than usual clypeus and the subobsolete malar space. The clypeus of the species *belfragei* Cresson, treated below, has a depressed apical margin; this peculiarity of the clypeus is present in both sexes, though markedly less distinct in males.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females subbristle shaped, short and stout, tapering toward apex, with abbreviated basal segments, ventrally flattened and somewhat widened beyond middle. Of males with a row of oval tyloids and with unobtrusive, transverse ridges from about the 4th segment on.

HEAD: Of females, in front view transverse, almost rectangular, clypeus extremely short and wide, in the type species more than 6 times as wide as medially long, in *belfragei* its apical margin narrowly depressed in both sexes. Temple profile not narrowed behind eyes, wide, more or less strongly curved. Median field of face and lateral fields more or less strongly protruding in females. Malar space short: in females nearly 1/2 as long as width of mandibles, in type species less than 1/2 as long, always subobsolete in males. Carina genalis and carina oralis meet at lower corner of mandible base. Face and clypeus coarsely and densely, in type species extremely densely, punctured.

THORAX: Mesoscutum about as long as medially wide, more or less densely punctured; notauli indicated at the base only. Carination of propodeum usually distinct and complete, except costulae obsolete in type species, in other species costulae distinct and meeting area superomedia behind middle; area superomedia narrowed toward area basalis, pentagonal or (in type species) forming a roman arch; lateral carinae of area posteromedia meet the carinae dentiparae interiores before hind corners of area superomedia.

LEGS: In females femora extremely stout, femora III in lateral view only about 3.5 times as long as medially wide; tibiae of females as described above (systematics, character No. 2). These characters are not found in males.

ABDOMEN: Median field of postpetiole ill defined in type species, well in other species, its sculpture usually a mixture of puncturation and longitudinal striation, sometimes partially smooth. Gastrocoeli obsolete in type species, subobsolete to distinct in other



Map 115. *Melanichneumon complicatus*, n. sp.

species, but always small and shallow; tergites 2-4 more or less densely punctured. Only in males of the European species *pachymerus* Ratzeburg is the space between gastrocoeli often longitudinally striate.

CHROMATIC CHARACTERS: Basic color of entire body and legs ferruginous orange in both sexes of the type species; other species are black, in combination with red or brown, in females sometimes with small, apical, white mark on the 7th tergite. Face and clypeus uniformly white (yellow) in males of all known species.

DISTRIBUTION: Holarctic Region. Two species of the Nearctic Region were originally included in this genus; a 3rd Nearctic species will be transferred to it below. The species *pachymerus* Ratzeburg so far placed in the genus *Ichneumon* Linnaeus and known only from the western Palearctic Region, is herewith transferred to the genus *Rictichneumon* and simultaneously recorded also from the Nearctic Region (1 female from North Dakota, USNM).¹

HOSTS: The type species was reared from *Alsophila pometaria* (Harris) (Townes and Townes, 1951:286). The Holarctic species *pachymerus* is considered in Germany as 1 of the most important parasites of *Panolis flammea* Schiff. (Noctuidae), a pest of pine forests, but has also been reared frequently from the looper, *Ectropis bistortata* (Goeze).

**1. *Rictichneumon belfragei* (Cresson),
new combination
Map 116**

Ichneumon belfragei Cresson, 1872:156, male.

Pseudamblyteles belfragei, Townes and Townes, 1951:292, male.

Holotype: male, Texas USNM. Neallotype: female, Texas; USNM.

SYSTEMATICS: The association of sexes is highly probable, but needs, nevertheless, further confirmation. Females are distinguished by a peculiarity in the structure of the clypeus: the narrow, apical margin is depressed all the way from side to side; this character is less clearly developed in males, but is indicated slightly.

MALE: Length 13-15 mm. Head and thorax black, with some white markings. Abdomen black, except reddish-brown tergites 2-4 and sometimes part of the post-

petiole. The following are white: sides of face and clypeus broadly, usually a narrow band or a mark on lower 1/2 of outer orbits, scutellum, subalarum entirely or in part, often a mark on tegulae and on collar, exceptionally also a small mark on apex of pronotal ridge. Legs predominantly black, apex of femora I and the tibiae I whitish on anterior side, brownish on posterior side. Antennae uniformly black. Wings moderately infuscated.

FLAGELLUM: With 39 segments and with tyloids on segments 5-14, the last punctiform, the longest, on segments 7-11 elongate oval and almost reaching from bases to apices of segments.

HEAD: Broad; temple profile not narrowed behind eyes, strongly curved; cheek profile short, slightly narrowed and curved toward mandible base; malar space subobsolete, about 1/4 as long as width of mandible base; clypeus about 3 times as wide as medially long, its narrow, apical margin depressed slightly. Median field of face distinctly, lateral field slightly protruding. Face and clypeus coarsely and densely, frons somewhat less coarsely and more densely punctured. Below lower ocellus a slight indication of a longitudinal impression. Mandibles fairly broad, with a long, pointed, apical tooth and an indication of a short, subapical tooth. Cheeks in lateral view broad and strongly convex, fairly densely and coarsely punctured.

THORAX: Mesoscutum about as wide as long, moderately convex, coarsely and densely punctured all over, glossy between punctures. Notauli indicated at base only. Scutellum slightly convex. Propodeum short, the area posteromedia more than twice as long as the horizontal part medially, very densely and coarsely rugose punctate all over. Area superomedia wider than long, with costulae behind middle, arched in front of costulae; area basalis fused with basal furrow. Lateral carinae of area posteromedia meet carinae dentiparae interiores far behind apical corners of area superomedia. All pleura coarsely and densely punctured.

LEGS: Femora moderately long and thick. Coxae III ventrally coarsely and fairly densely punctured, glossy between punctures.

ABDOMEN: Postpetiole with fairly clearly delimited median field, the median field irregularly and not densely punctured, smooth between punctures, sometimes with vestiges of irregular, fine rugosity; the lateral fields more densely and regularly punctured;

¹ Dr. R. W. Carlson drew my attention to this specimen and forwarded it to me for examination.

the following tergites fairly finely and not very densely punctured, glossy between punctures. Gastrocoeli distinct, though small and shallow, forming small impressions in the exterior corners of the base of 2nd tergite, with distinct, though small and narrow thyridia.

FEMALE: Length 10-14 mm. Head, thorax, and abdomen red, with the following black parts: prosternum, prepectus, tegulae, and all or part of mesosternum. Legs black including coxae, the coxae III sometimes red on dorsal side; tibiae I and sometimes apical part of femora I brownish on anterior side. Seventh tergite with apical white mark; basic color of tergites 6 and 7 black or blackish infuscated. Antennae black, flagellum with dorsal white annulus on segments 9 or 11 to 12, sometimes entirely black. Wings moderately infuscated.

FLAGELLUM: Short, subfiliform, slightly attenuated toward apex, ventrally flattened and slightly widened beyond middle, with 36 very short segments, the 1st only slightly longer than apically wide, the 3rd or 4th approximately square, the widest on the flat side, about 1.5 times as wide as long.

HEAD: Wide, the temple profile somewhat widened behind eyes, curved, cheeks in lateral view extremely wide and strongly convex; clypeus very short and extremely wide, its narrow apical section evenly depressed from side to side; mandibles long, broad at base, gradually tapering toward apex into a long, apical tooth, flattened and smooth, the subapical tooth indicated by a notch only. Malar space slightly shorter than width of mandible base; cheeks smooth and glossy, with sparse puncturation; frons densely punctured, coriaceous between punctures.

THORAX: Mesoscutum coarsely and fairly densely punctured, glossy between punctures; carination of the propodeum as described for the male, except that the area superomedia is more elongate.

LEGS: Femora short and thick, femora III in lateral view about 3.5 times as long as medially wide; tibiae also rather short, gradually widened from base to apex, covered by whitish pilosity, and on dorsal sides and apices also by a fairly dense stand of short, sharply-pointed spines; coxae glossy on ventral side, with sparse puncturation.

ABDOMEN: Median field of postpetiole fairly clearly delimited, irregularly longitudinally striate and punctured. Gastrocoeli as in male. The 2nd tergite rather densely

punctured, the punctures running into irregular, longitudinal rugosity; the 3rd tergite likewise densely, but somewhat finer and more neatly punctured; the 4th tergite still finer and less densely punctured. Ovipositor slightly projecting.

DISTRIBUTION (map 116): Texas, Louisiana, Colorado (Townes and Townes, 1951: 292, males only). TEXAS. Females; in USNM. LOUISIANA. Lafayette, 10-5-1936, one male (CGH II).

30. Genus *Aoplus* Tischbein

Aoplus Tischbein, 1874:137. Townes and Townes, 1951:290-291 (*Stenichneumon* Thomson treated as synonym; 5 *Aoplus* species and 1 subspecies from the Nearctic Zone). Townes, et al., 1961:345 (2 Indo-Australian species). Heinrich, 1962:533-559 (14 Nearctic species). Townes, et al., 1965:456-458 (12 eastern Palearctic species).

Type species: *Aoplus inermis* Tischbein.

Trachichneumon Viereck, 1912a:645.

Type species: *Trachichneumon confirmatus* Cresson.

SYSTEMATICS: The genus shows a superficial similarity to *Stenichneumon* Thomson by its transverse gastrocoeli with the narrowed interspace and by the strongly oxypygous, slender abdomen of females. *Aoplus* differs from *Stenichneumon* by considerably finer sculpture, particularly by



Map 116. *Rictichneumon belfragei* (Cresson)

the complete absence of striation on postpetiole and on 2nd tergite, both are finely coriaceous or alutaceous instead. It is this sculpture which contradicts a close relationship of *Aoplus* to *Stenichneumon* and suggest the attribution of *Aoplus* to the subtribe *Cratichneumonina*.

The genus, rather common and represented by many species in northeastern North America, is practically absent in the southeastern states, where only 1 species is known.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females usually bristle shaped and slender, considerably attenuated toward apex, and, in a few species, filiform and stout; of males with a fairly short row of bacilliform tyloids.

HEAD: Temple profile and cheek profile usually rather strongly narrowed.

THORAX: Mesoscutum longer than wide, more or less convex, usually densely sculptured and subopaque; notauli basally indicated or distinct; scutellum slightly raised above postscutellum, more so in males than in females; carination of propodeum usually weak, the costulae usually obsolete or subobsolete; area superomedia in females usually about as long as wide.

LEGS: Coxae III of females often with scopa.

ABDOMEN: Of females, as a rule, slender, strongly oxygyous, the ovipositor slightly projecting; median field of postpetiole more or less distinctly indicated, never aciculate, finely coriaceous or alutaceous; gastrocoeli shallow, transverse, with narrow interspace, with usually oblique thyridia; sculpture of 2nd tergite similar to that of the postpetiole.

DISTRIBUTION: Holarctic Zone. In the Ethiopian Zone replaced by the closely related genus *Stenaoplus* Heinrich.

HOSTS: Geometridae.

BIOLOGY: Females hibernate.

1a. *Aoplus confirmatus confirmatus* (Cresson)

Ichneumon confirmatus Cresson, 1877:178, female.

Phygadeuon jocosus Provancher, 1886:47, 53, female.

Aoplus confirmatus Townes and Townes, 1951:290, female. Heinrich, 1962:537-539, female, male.

Holotypes: *Ichneumon confirmatus*, female,

New York; ANS. *Phygadeuon jocosus*, female, Quebec; PMQ.

Neallotype: male, Maine; CGH II.

SYSTEMATICS: The largest of the North American species of this genus. Females are distinguished chromatically by orange basic color of nearly the entire body, the orange mesoscutum, parts of head and of pronotum varying geographically and individually to partially or predominantly black; scutellum and orbits around eyes always ivory; additional distinguishing characters for the female are: (1) flagellum bristle shaped, considerably attenuated toward apex and somewhat widened beyond middle; (2) coxae III on inner side toward apex fairly densely pilose (the pili not forming a distinct scopa). Males differ chromatically strikingly from the females: the abdomen is black, with apical ivory bands on tergites 1-3, the basic color of the entire thorax is also black, and the femora, tibiae, and tarsi are ivory, except tarsi III sometimes infuscated.

FEMALE: Length 13 mm. Head orange, orbits around eyes broadly ivory (narrowed on temples, usually narrowly interrupted on malar space), antennal cavities, middle of frons, ocellar and occipital regions varying from ferruginous to partially or predominantly black; thorax orange, the following ivory: collare, pronotal ridge broadly, pronotal base (usually more narrowly or sometimes incompletely), subalarum, scutellum, postscutellum, tegulae (varying to orange); the following black: base of prosternum, middle of pronotum more or less extensively, usually band below subalarum; prepectus and pronotum sometimes entirely black; mesoscutum varying from uniformly orange to almost entirely black, in the latter case usually with ferruginous median mark or with 2 short, ferruginous, median stripes; legs uniformly orange, exceptionally tip of femora III infuscated; coxae I and II usually more or less extensively ivory marked; abdomen uniformly orange, sometimes postpetiole apically ivory tinged; flagellum black with complete white annulus; scape ventrally orange.

FLAGELLUM: Bristle shaped, gradually considerably attenuated toward apex, ventrally flattened beyond middle and slightly widened, with usually 35 segments, the 1st fully 3 times as long as wide, in lateral view the 13th square, the widest 1.3-1.75 times as wide as long.

HEAD: Temple profile and cheek profile strongly narrowed, straight; occiput abruptly and steeply declivous from hind margin of

ocelli and eyes; malar space about as long as width of mandible base.

THORAX: Mesoscutum markedly longer than wide, convex, densely punctured, coriaceous between punctures, opaque; anterior 1/3 of notauli distinct; scutellum distinctly raised above postscutellum, convex, apically truncate and obliquely sloping toward postscutellum, laterally weakly carinate at the extreme base; horizontal part of propodeum densely, irregularly coriaceous rugose, the area superomedia finer sculptured than the rest, nearly parallel sided, square, or slightly longer than wide.

LEGS: Moderately slender, coxae III ventrally densely and finely punctured, their inner side fairly densely pilose toward apex but without distinct scopa.

ABDOMEN: Median field of postpetiole clearly defined, finely irregularly rugose and coriaceous; 2nd tergite finely and densely punctured, coriaceous between punctures, subopaque.

MALE: (specimens from Maine). Length 13-15 mm. Black, the following ivory: mandibles except teeth, clypeus, face, frontal orbits broadly up to upper ocelli, spots on vertical orbits, outer orbits broadly below temple region, collare, pronotal ridge broadly, pronotal base (at least toward apex) narrowly, tegulae, subalarum, scutellum, postscutellum, prosternum except base, a longitudinal mark on mesosternum along sternauli, rarely a small mark on apex of area dentipara or on lower 1/2 of mesopleura, legs (except black coxae III, trochanters III, base of coxae I and II, and usually partially infuscated tarsi III), and broad, apical bands on tergites 1-3; sometimes femora I and II or even III with blackish longitudinal band on ventral side; apical ivory band on the 3rd tergite sometimes ferruginous tinged or medially interrupted; flagellum black, without annulus, scape ventrally ivory.

FLAGELLUM: With about 35 segments and with elongate, bacilliform tyloids on segments 7-15.

HEAD: Malar space about 1/2 as long as width of mandible base.

THORAX: Scutellum still stronger raised above postscutellum and stronger convex than in female; area superomedia more abbreviated, wider than long.

ABDOMEN: Sculpture of postpetiole and of 2nd tergite coarser than in female.

DISTRIBUTION: Quebec south at least to New York.

1b. *Aoplus confirmatus insignitior*, new subspecies

Map 117

FEMALE: Length 12 mm. Differs from *confirmatus confirmatus* by uniformly ivory face and clypeus and ivory (instead of orange) mesosternum and about lower 1/2 of mesopleura; mesoscutum (in holotype) black, with 2 longitudinal, median ivory stripes of moderate length and ivory-marked pre-scutellar carinae.

Holotype: female, Tennessee, Henderson Co., Natchez Trail State Park, 20-25-V-1972 (CGH II).

DISTRIBUTION (map 117): Tennessee and Missouri. MISSOURI. Wayne Co.: 1 female, Williamsville, near Popular Bluff, J. T. Becker. TENNESSEE. 1 female, same data as holotype. All specimens in CGH II.

31. Genus *Limonethe* Townes

Fig. 57-58

Limonethe Townes, 1946:56. Heinrich, 1962:560 (1 species from eastern North America). Townes and Townes, 1966:258-259 (3 species between Mexico, Caribbean Islands, and Argentina).

Type species: *Joppa maurator* Brulle; original designation.

SYSTEMATICS: This is a genus of Neotropical origin. In structure and sculpture it seems to be related to the *Melanichneumon* group of the subtribe Cratichneumonina, and



Map 117. *Aoplus confirmatus insignitior*, n. subsp.

the small projection in the middle of the area basalis points to the same direction. But the areolet is strikingly different from that subtribe as well as from all other Palearctic, Oriental, and Ethiopian subtribes and genera, finding a counterpart only in a 2nd Neotropical genus, *Trogomorpha* Ashmead. How far goes the significance of the shape of the areolet as a subtribal or tribal character? This question is difficult to answer and cannot be answered at all without further study of the Neotropical fauna. I suspect that the peculiar shape of the areolet hints toward a subtribal relationship of the 2 above mentioned genera and perhaps still other genera, but for the time being *Limonethe* may tentatively be placed in the Cratichneumonina.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females fairly short, subbristle shaped, ventrally flattened, and markedly widened beyond middle, distinctly, though not very strongly, attenuated toward apex; of males with a row of small, very inobtrusive tyloids, and with very distinct, transverse, subapical bristle ridges on ventral side of segments.

HEAD: Temple profile moderately narrowed behind eyes, slightly curved; cheek profile, in front view, considerably narrowed toward mandibles, straight; malar space in female slightly, in male markedly shorter than width of mandible base; cheeks in lateral view fairly narrow but distinctly convex; distance of carinal junction from mandible base equal to about 1/2 the width of the latter; frons moderately concave, densely punctured; face and clypeus almost flat, the latter with straight apical margin, median field of face very slightly protruding; clypeus with a transverse row of densely set, coarse punctures just before apical margin, which is slightly raised; mandibles with a long, pointed, apical tooth, the subapical tooth rudimental, indicated only by a small notch.

THORAX: Mesoscutum longer than medially wide, moderately convex, densely and very coarsely punctured, somewhat shiny; notauli distinct only at the base; sternauli weakly indicated; scutellum comparatively long, with straight sides, gradually narrowed toward apex, somewhat raised above postscutellum (more in males than in females), gradually sloping toward the postscutellum, coarsely, moderately densely punctured, medially at base slightly protruding toward mesoscutum; area posteromedia somewhat longer than horizontal part of propodeum medially; area superomedia (fig. 57) usually somewhat longer than wide, hexagonal, with

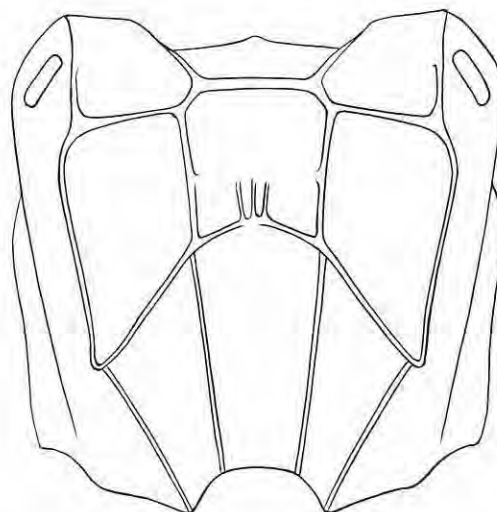


Fig. 57. *Limonethe maurator* Brullé (male). Propodeum, dorsal view.

costulae very close to anterior end, narrowed from costulae to area basalis, usually also slightly narrowed toward posterior end; area basalis with small median projection toward postscutellum; areae dentiparae slightly slanting, their apices slightly projecting; costulae oblique; mesopleura very coarsely punctured, speculum smooth; propodeum extremely coarsely rugose punctate; carination of propodeum complete, except indistinct or obsolete carinae coxales.

LEGS: Moderately long; coxae III of females without scopa, coarsely and densely punctured, shiny.

WINGS: Nervulus far postfurcal, oblique; areolet large, of a peculiar shape: the intercubiti subparallel, areolet hence unusually wide in front, slightly approaching a square shape, particularly as the 2nd recurrent vein meets the areolet rather close to its exterior corner; radius apically slightly curved toward margin of wing.

ABDOMEN: Of females oxygygous, the ovipositor almost hidden; hypopygium of females fairly long, covering basal part of slit of ovipositor; postpetiole fairly narrow, coarsely and fairly densely punctured, the median field basally well defined, apically indistinct; (fig. 58) gastrocoeli small, distinct (though shallow), with distinct thyridia, their interspace about twice as wide as 1 of them, not striate; 2nd and 3rd tergites fairly coarsely, moderately densely punctured, extremely finely coriaceous between punctures, somewhat shiny, parallel sided, the 4th tergite extremely finely, sparsely punctured

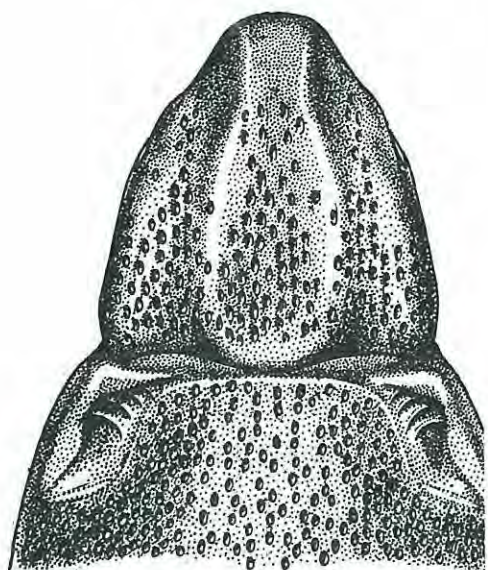


Fig. 58. *Limonethe maurator* Brullé (female). Abdominal tergites 1-2, dorsal view.

on basal 1/2; in males tergites 1-4 coarsely, the 5th finely punctured.

CHROMATIC CHARACTERS: Type species black, with red abdomen and red femora III, deeply infuscated wings, and white annulus of flagellum, all in both sexes.

DISTRIBUTION: Neotropical Region with 1 species reaching north into the eastern Nearctic area.

1. *Limonethe maurator* (Brullé)

Fig. 57-58, Map 118

Joppa maurator Brullé, 1846:287, female, male.

Ichneumon insolens Cresson, 1867:302, female, male.

Joppa canadensis Provancher, 1874:336, female.

Limonethe maurator, Townes and Townes, 1951:284, female, male. Heinrich, 1962:560-561; female, male.

Holotypes: *Joppa maurator*; MNHN. *Ichneumon insolens*, female, Louisiana; ANS. *Joppa canadensis*, female, Quebec; PMQ.

FEMALE: Length 12-16 mm. Head and thorax coal black, almost without white marks; abdomen and femora III vivid red; rest of legs deep black, the tibiae I and apex of femora I ivory on inner side; wings evenly and deeply infuscated; flagellum black, with dorsal white annulus on segments 7 or 8 to 14 or 15; scape black.

FLAGELLUM: Structure as described for the genus; with 39-41 segments, the 1st twice as long as apically wide, in lateral view the 7th square, the widest, seen on the flat side, more than twice as wide as long.

HEAD AND THORAX: Structure and sculpture as described for the genus; vertical orbits usually with tiny white marks, collare often partially white; upper part of mandibles red brown, except apically.

MALE: Length 12-18 mm. Agrees with female in color, except that the facial orbits are white, in addition to small white dots on vertical orbits.

FLAGELLUM: With 40-42 segments and with indistinct, small, oblong tyloids on about segments 6-21. Black, with dorsal white annulus on segments 12 or 13 or 14 to 19 or 20 or 21; scape black.

DISTRIBUTION (map 118): Quebec south to Florida, west to Colorado; Atlantic to 100° W. in Upper and Lower Austral Zones; rarely in Transition Zone (Townes and Townes, 1951). ARKANSAS. Garland Co.: 1 male, Ouachita State Park, 17-22-V-1972, G. Heinrich, D. Shaneck. FLORIDA. Alachua Co.: 2 females, 11 males, Gainesville, 13-III-24-V, 27-X-17-XII, G. Merrill, H. Weems, R. Morse, Clay Co.: 1 female, Orange Park, 28-IV-1971, G. Heinrich. Collier Co.: 5 males, Copeland, 7-15-VI-1967, G. Heinrich. Dade Co.: 2 females, Everglades National Park, 10-



Map 118. *Limonethe maurator* Brullé

IV-1955, H. Weems; 1 male, Homestead, 27-II-1936, H. Weems; 2 females, 5 males, Mathe-son Hammock, 8-11-IV-1955, H. Weems. Highlands Co.: 7 females, 23 males, Archbold Biological Station, 2-V-20-VI-1967, G. Heinrich; 1 female, 2 males, Highlands Hammock State Park, 18-VII-6-XI-1954, H. Weems; 1 female, Sebring, 20-II-1953, H. Weems. Lee Co.: 6 females, 8 males, Ft. Myers, XII-1964, 28-I-28-VII-1967-1968. G. Heinrich, D. Radtke. Levy Co.: 1 male, 6-V-1955, R. Morse. Monroe Co.: 1 male, 11-XII-1936, O. Barens, Orange Co.: 2 females, Orlando, 7-II-1925, 15-III-1934; 2 males, Winter Park, 30-IV-1942, H. Fernald. Pinellas Co.: St. Petersburg, 16-VI-1951, G. Heinrich. GEORGIA. Banks Co.: 8 males, Homer, 13-V-1970, G. Heinrich, R. Duffield. Clarke Co.: 2 females, 8 males, Athens, 27-VII-21-X-1970, H. Hermann. Jasper Co.: 4 males, Monticello, 15-V-1970, G. Heinrich. Monroe Co.: 4 females, 3 males, Forsyth, V-X-1968-1970, F. Naumann. LOUISIANA. Webster Co.: 1 male, Bistineau State Park, 16-IV-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 1 female, 3 males, Starkville, 12-VI-15-VIII-1970, C. Sartor, Yalobusha Co.: 1 female, 7 males, Water Valley, 11-VI-10-VII-1970-1971, G. Heinrich, M. Horan. TENNESSEE. Hender-son Co.: 1 male, Lexington, 4-VI-1972, D. Shaneck. All specimens in CGH II and FSCA.

ECOLOGY: This is 1 of the few species of the subfamily which do not avoid the direct sunshine of open country. It is found almost everywhere, along railroad tracks and embankments, along roadsides, edges of forests, gardens, in forest clearings and overgrown fields. One of the most common species of the southeastern fauna.

32. Genus *Carinodes* Hancock

Carinodes Hancock, 1926:189. Townes and Townes, 1966:255, 321 (*Ditremops* as new synonym; 31 species).

Type species: *Carinodes spinosus* Hancock; original designation.

Ditremops Townes, 1946:52.

Type species: *Ichneumon abjectus* Creson; original designation.

SYSTEMATICS: A Neotropical group with an abundance of forms, of which apparently only a fraction has been named so far; Townes estimates the number of species he has at hand at about 120. The most obvious, common character of this enormous multi-tude of forms is the extra carina of the propodeum, which runs lengthwise through the middle of the area superomedia, dividing

it into 2 halves. Such striking characters are very fascinating to the eye of the taxonomist and have often led them to neglect the evaluation of other, no less important morphological features. I suspect that this applies also to our present conception of the genus *Carinodes* which, after careful studies, will most likely be divided to form a number of genera. At least this is what I suppose after studying the 2 Florida species attributed to *Carinodes* and finding that they can not possibly be regarded as congeneric. It may be mentioned here, that a longitudinal median carina of the area superomedia is not an entirely unique character nor necessarily an indicator of close relationship within the subfamily Ichneumoninae, as it occurs occasionally more or less distinctly in quite unrelated genera, as in *Trogomorpha* Ashmead and the Ethiopian genus *Foveosculum* Heinrich (Heinrich, 1967-1968:601, fig. 145).

The most striking and important of the numerous structural differences between the 2 Florida species (*havanensis* (Cameron) and *albipectus* (Brullé)) is in the clypeus. In *havanensis* the clypeus is flat, apico medially considerably depressed and its median margin is thinned, with a slight emargination in the middle and a gentle protrusion on each side of it, a structure recalling the Ethiopian genus *Foveosculum*. In *albipectus* the clypeus is different: the apical margin is straight, not the least thinned, and the entire surface is in females evenly and strongly, in males slightly, convex, without any trace of median impression. I consider a structural difference of this kind to be generic. There are other differences too, which will be discussed in the treatment of *albipectus* and the generic characters of that species.

In the original description of the type species of *Carinodes* (*spinosus* Hancock), the clypeus is described as "apically impressed with a very slight apical emargination." Hence, if 1 of the 2 Florida species indeed belongs to the genus *Carinodes*, it can only be *havanensis*. I am consequently attributing the latter species tentatively to *Carinodes* and introducing a new generic name for *albipectus*. The definition of the 2 genera, as given below, is based on only the 2 Florida species and remains therefore incomplete, until a future revisor of the entire complex group will subdivide it properly and establish comprehensive diagnosis for all genera contained.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females subfiliform, fairly stout, ventrally flattened beyond middle, of males with slightly depressed basal part,

distinctly nodose, with distinct, median, transverse bristle ridges on ventral side and with a row of conspicuous tyloids.

HEAD: Transverse, temple profile moderately narrowed behind eyes and curved; frons rather strongly concave up close to lower ocellus, above with a distinct, longitudinal, median elevation; ocelli surrounded in front by a deep furrow; occiput steeply declivous immediately behind ocelli; malar space shorter than width of mandible base, in both sexes; carina genalis parallel to hind margin of eyes; cheeks rather narrow and moderately convex; clypeus flat, with median impression and apical margin as described in systematics, in both sexes; median field of face slightly protruding; mandibles about parallel sided, with long and strong apical and short subapical tooth.

THORAX: Mesoscutum moderately convex, sparsely punctured, polished between punctures, with only basal part of notauli distinct; scutellum flat, laterally not distinctly carinate but with partially sharp lateral edges; pronotal ridge distinctly swollen; propodeum abbreviated, the area postero-media about 3 times as long as area superomedia, the latter with pronounced, longitudinal, median carina, and about as wide as long, roughly horseshoe shaped; areae dentiparae with elongate, downward slanting narrowed tips; area basalis also with median, longitudinal ridge; mesopleuron with long, pronounced depression below speculum; spiracles long, slit shaped.

LEGS: Moderately long.

WINGS: Nervulus vertical and slightly antefurcal; areolet practically rhomboidal, with intercubiti almost coalescent in front; radius long and slightly sinuate.

ABDOMEN: Postpetiole coarsely but sparsely punctured in females, only laterally punctured in males, basally with sharply prominent, longitudinal ridges, delimiting the base of the median field, the latter further on obsolete; in females only 2nd tergite fairly coarsely and densely punctured, the following tergites polished; in males tergites 2 and 3 coarsely and densely punctured, polished between punctures, the 4th tergite finely and sparsely punctured; gastrocoeli small and shallow, polished, without ribs or rugae, with fairly distinct thyridia.

DISTRIBUTION: Central and South America, recorded from Florida and Mexico south to Peru.

**1. *Carinodes havanensis* (Cameron)
Fig. 59-60, Plate 6, Map 119**

Ichneumon? havanensis Cameron, 1906:277, male.

Carinodes havanensis, Heinrich, 1937:262, male. Wolcott, 1948:767 (Puerto Rico). Townes and Townes, 1966:256.

Carinodes phavanensis, (sic!), Beatty, 1944: 164 (St. Croix).

Carinodes havenensis, (sic!) Short, 1959:455 (fig. of larva).

Holotype: male, Havana, Cuba; BM(NH). Neallotype: female, Orange River, Ft. Myers, Lee Co., Florida 15-III-1968; CGH II.

SYSTEMATICS: A medium-sized, handsome species, strikingly colored; in structure distinguished by a fairly pronounced, medio-apical depression on the clypeus, by a rhomboidal areolet (with intercubiti practically coalescent in front), and by polished tergites from the 3rd on.

FEMALE: Length 13-15 mm. Head white, with entire antennal cavities, middle of frons, ocellar, occipital and posterior belt of temple regions, black; thorax black, with extremely rich white pattern as follows: collare, pronotal ridge broadly, 2 short median lines on mesoscutum, prescutellar carinae, scutellum (except narrowly black base), postscutellum, a mark before spiracles of propodeum, areae posteroexternae together with carinae dentiparae interiores, areae metapleurales nearly entirely, a large mark on upper 1/2 of mesopleura (including also subalarum), another large mark on lower 1/2 of mesopleura, and carinal triangle; abdomen light red, postpetiole with 2, toward middle narrowed and confluent, apico-lateral white marks; femora, trochanters, and coxae III red, dorsal side of femora I and II reddish to brownish, the former ventrally light yellow, the latter ventrally yellow-tinged orange; all femora dorso apically more or less extensively black or blackish; all tibiae predominantly pale yellow, as are also the tarsi III; tarsi I and II basally pale yellow; coxae and trochanters I and II predominantly ivory; coxae III dorsally with large ivory mark; black or blackish are: base of tibiae III, apex of tibiae III on each side narrowly, 5th segment of tarsi II except base, and 5th segment of tarsi I and II entirely; segments 1-4 of tarsi I and II (except basally extensively yellow metatarsi), and apices of all tibiae orange tinged; flagellum deep black, with complete white annulus on segments 9 or 10 to 20 or 21.

FLAGELLUM: Robust, subfiliform, dis-

tinctly widened and ventrally flattened beyond middle, slightly attenuated at the very end, with (seemingly constantly) 42 segments, the 1st twice as long as apically wide, in dorsal view the 9th square, the widest, seen on the flat side, slightly more than twice as wide as long.

HEAD (fig. 59): Temple profile barely narrowed behind eyes, with strongly curved outline; occiput deeply emarginate; frons concave; ocellar region surrounded by a distinct furrow; frons below lower ocellus with short longitudinal ridge; malar space less than $1/2$ as long as width of mandible base; cheek profile in front view distinctly narrowed toward mandibles, with straight outline; mandibles robust, nearly parallel sided, with large, long apical, and short subapical tooth; clypeus about 4 times as wide as medially long, with a very distinct medio-apical depression, its apical margin on each side of that depression with a small, thinned, gently protruding lobe; face also about 4 times as wide as medially long, the median field moderately protruding; antennal cavity not bipartite, forming 1 large, smooth, evenly and deeply concave depression.

THORAX: Mesoscutum barely convex, with coarse and sparse puncturation, polished between punctures; anterior $1/4$ of notauli pronounced; sternauli indicated, indistinctly crenulate; scutellum flat, not distinctly carinate laterally, but with sharp lateral edges; area posteromedia nearly twice as long as horizontal part of propodeum medially; propodeum almost without basal furrow, with very prominent and complete carination (fig. 60), area superomedia approximately horseshoe shaped, about as

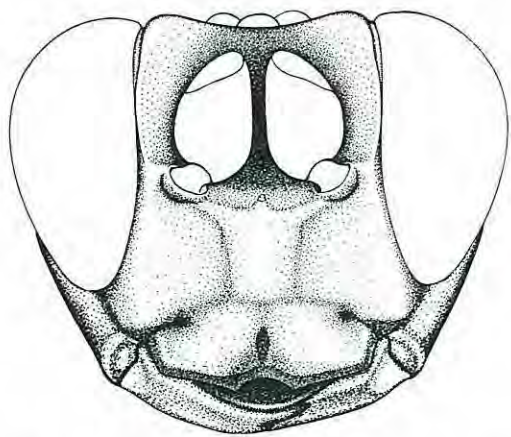


Fig. 59. *Carinodes havanensis* Cameron (female). Face, frontal view.

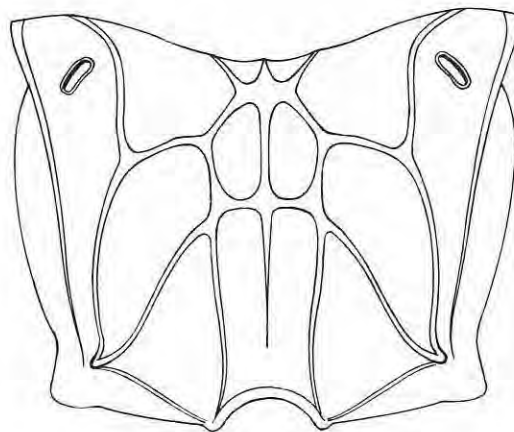


Fig. 60. *Carinodes havanensis* Cameron (female). Propodeum, dorsal view.

long as wide, usually distinctly narrowed toward the (straight) apical carina, rounded in front, with a strong, longitudinal carina in the middle; area basalis not depressed, usually also with longitudinal, median carina, as usually also present on uppermost part of area posteromedia; areae dentiparae with long, drawn out and narrowed, slanting tips; metapleura and mesopleura coarsely and sparsely punctured, the latter with deeply concave, fairly long, smooth depression below smooth speculum; propleura smooth, with a row of short, longitudinal, coarse rugae along apical margin.

LEGS: Moderately long; coxae III with distinct scopa, coarsely and fairly densely punctured.

WINGS: Nervulus interstitial; areolet rhomboidal; radius long and slightly sinuate.

ABDOMEN: Oxypygous, rather strongly tapering from 4th, polished from 3rd tergite on; median field of postpetiole basally very clearly defined by cariniformly prominent lateral edges, its apical part indistinct, coarsely and sparsely punctured, 2nd tergite densely and fairly finely punctured; gastrocoeli fairly small, superficial, smooth, without longitudinal ribs or rugae, thyridia fairly distinct, small.

MALE: Length 12-14 mm. Differs from female chromatically only by slight increase of black and a more substantial increase of white markings; in addition to female, black are: usually a small spot on malar space, a narrowing band from posterior black part of temple region downward along carina genalis toward mandibles, usually entire posterior side of femora I and II, often dorsal sides of 1st trochanters, and broad apex of

tibiae III; in addition to white marks of female, white are: prosternum (except base), either the mesosternum entirely (except black, median furrow) or a longitudinal, broad band on each side of median furrow and the space between sternauli and mesopleura, small mark on lower part of pronotal base, mark on tegulae, a transverse band or line on propodeum in front of costulae and of area superomedia from side to side of horizontal part, exterior belt of prepectus, usually the entire 5th segment of tarsi III, coxae III dorsally more extensively than in female; flagellum black, with complete white annulus on segments 13 or 14 to 25; scape ventrally white.

FLAGELLUM: Strongly nodose, with very distinct, median, transverse bristle ridges, on ventral side, which bears besides very short bristles a few scattered long bristles; basal section of flagellum somewhat depressed; with 44-47 segments, and with conspicuous, longish-oval, white tyloids on segments 7 or 8 to 25 or 26, the longest (on about segments 12-15) reaching closer to bases than to apices of segments.

HEAD: Malar space about $1/3$ as long as width of mandible base. Otherwise as in female.

THORAX: Scutellum somewhat more convex as in female; otherwise structure as described for female.

ABDOMEN: Base of postpetiole without cariniformly raised lateral edges of median field, the latter not punctured, smooth; gastrocoeli slightly deeper impressed than in female; tergites 2 and 3 coarsely and rather densely, the 4th tergite to beyond middle more sparsely and finely punctured, the rest polished; hypopygium normal, forming a blunt triangle. First tergite dorsally black, with broad, continuous, apical white band; otherwise as described for female.

DISTRIBUTION (map 119): Cuba, Puerto Rico, St. Croix, and Florida. From Florida as follows: Dade Co.: 1 female, Coral Gables, 15-IV; 3 males, Homestead, 1-X-14-XI; 1 male, Matheson Hammock, 8-IV; Miami, 1 male, 7-III, 1 female, 9-V-1962, J. Stephens (in fruit fly trap); 1 female, 1 male, Ross and Castello Hammock, 7-11-IV-1959, H. Weems. Highlands Co.: 1 female, 1 male, Archbold Biological Station, G. Heinrich. Lee Co.: 33 females, 7 males, Ft. Myers, 12-I-5-VI-1968-1973, G. Heinrich, D. Radtke. Manatee Co.: 1 male, 6-IV-1964, D. Chancey (in Steiner trap); 1 female, Palma Sola, 16-III. Monroe Co.: 1 female, Key Largo, 26-III. Polk Co.: 1 female, Providence, 30-XI. Sarasota Co.: 1 female,



Map 119. *Carinodes havanensis* Cameron

Sarasota, 28-III-1967, S. Hiatt (in Steiner trap). Seminole Co.: 1 male, Longwood, 3-XI. Volusia Co.: 1 female, Daytona Beach, 17-XI-1972, D. Radtke. CGH II and FSCA.

ECOLOGY: Usually found among low plants and bushes shaded by forest.

33. Genus *Paraditremops*, new genus Fig. 61-62

Type species: *Ichneumon albipectus* Brullé, present designation.

SYSTEMATICS: The type species shares with *Carinodes* Hancock the longitudinal median carina of the area superomedia, but little else. It is most decisively and obviously generically distinguished from *Carinodes* in structure of the head, particularly of the clypeus (fig. 61); the clypeus is not medially depressed and not medioapically thinned and emarginate, but on the contrary rather strongly convex all over, with straight and normal border. In this structure, and also in the clearly pentagonal areolet, the type species is apparently more closely related to the type species of the genus *Ditremops* Townes (*abjectus* Cresson) than to *Carinodes*. The genus *Ditremops* has been synonymized (Townes and Townes, 1966) with *Carinodes*. *Ditremops* appears to me to be well distinguished from *Carinodes*; however, it is not in the scope of this publication to discuss or question the synonymization of these 2 genera. It may be stated only that, if

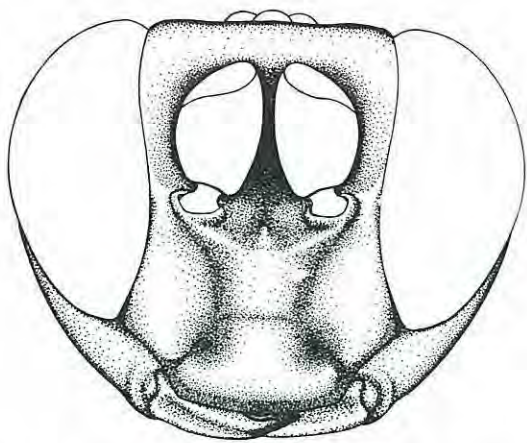


Fig. 61. *Parditremops albipectus* (Brullé) (female). Face, frontal view.

Carinodes and *Ditremops* should be regarded as separate genera again, the species *albipectus* cannot be attributed to *Ditremops* either as it differs from the latter rather strongly in the morphology of the propodeum (fig. 62). The propodeum is markedly depressed and flattened, with the horizontal part being medially longer than the area posteromedia, and with the areae dentiparae slanting gently downward to the margins of areae posteroexternae, without showing the slightest tendency to form apical projections. In contrast herewith, in the type species of *Ditremops* the areae dentiparae are apically rising instead of slanting, and forming upward curved, distinct apophyses, a difference of principal importance, and as a rule considered to be an indication of generic distinction.

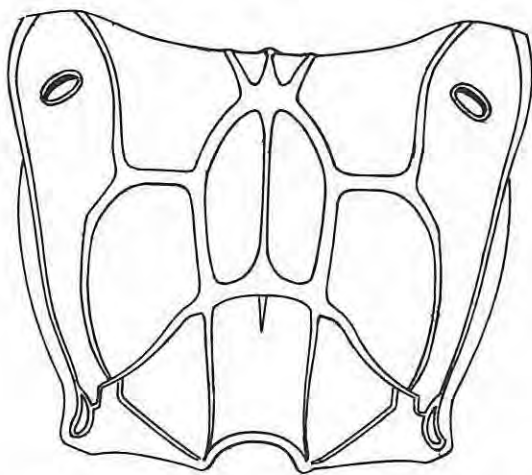


Fig. 62. *Parditremops albipectus* (Brullé) (female). Propodeum, dorsal view.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females filiform, with short basal segments (as in *Barichneumon* Thomson), ventrally flattened beyond middle; of males (likewise as in *Barichneumon*) without depressed basal part, distinctly nodose, with distinct, transverse, median bristle ridges on ventral side, in type species with row of short, small, unobtrusive tyloids.

HEAD: Temple profile distinctly narrowed behind eyes, slightly curved; frons evenly convex halfway down to antennal sockets; cheek profile distinctly narrowed toward mandible base; malar space short, fully $1/2$ as long as width of mandible base in females, $1/3$ as long in males; clypeus evenly and fairly strongly convex, with normal, straight, apical border; median field of face and lower parts of lateral fields also markedly protruding; face and clypeus sparsely and very coarsely, frons sparsely and more finely punctured, all polished between punctures; mandibles normal.

THORAX: Moderately convex, coarsely and rather densely punctured, polished between punctures; with only basal part of notauli distinct; scutellum flat, laterally not carinate; propodeum elongate and depressed, the horizontal part medially longer than the area posteromedia, the area superomedia considerably longer than wide in both sexes, fairly narrow and nearly parallel sided, forming approximately a roman arch or hexagon, with costulae far before middle and with distinct longitudinal median carina, on each side of the latter with another, less distinct, longitudinal elevation or carina; area basalis also with longitudinal, median carina; carinae dentiparae interiores meeting posterior angles of area superomedia, areae dentiparae slanting gently toward areae posteroexternae, their apices not the least projecting; spiracles small, short oval; propodeum, mesosternum, and mesopleura (except area of speculum) very coarsely and rather densely punctured, polished between punctures.

LEGS: Moderately long; in type species coxae III with weak scopa and femora fairly stout.

WINGS: Nervulus slightly oblique and slightly antefurcal; areolet clearly pentagonal, with intercubiti well separated in front; radius short and practically straight.

ABDOMEN: Of females oxypygous; in type species postpetiole and 1st tergite (in reversed sexual dimorphism as compared to *Carinodes havanensis*) in females almost smooth, with only a few scattered very fine

punctures, coarsely and rather densely punctured in males; the following tergites all smooth and shiny in females, tergites 3-5 (except apically) distinctly and moderately densely punctured in males; postpetiole without median field; gastrocoeli superficial, smooth, without rugae; thyridia distinct.

DISTRIBUTION: Central America, Cuba, Jamaica, and Florida.

1. *Paraditremops albipectus* (Brullé)

Fig. 61-62, Map 120

Ichneumon albipectus Brullé, 1846:306, male.

Ichneumon burrus Cresson, 1865a:14, female.

Cratichneumon burrus, Townes, 1944:334 (Cortez Beach, Florida).

Carinodes albipectus, Townes and Townes, 1966:255 (quotations until 1966).

Holotype: *Ichneumon albipectus*, male, Cuba; MNHN. *Ichneumon burrus*, female, Cuba; ANS.

SYSTEMATICS: A small species, in general appearance and chromatic pattern rather similar to a *Barichneumon* species. Distinguished chromatically by lack of white marks on propodeum and pleura in both sexes and by uniformly white sterna in males. The following description based on specimens from Florida only.

FEMALE: Length 7 mm. Ferruginous red; the following white: orbits broadly around eyes (sometimes except facial orbits), base of mandibles, collare, pronotal ridge, usually mark on subalarum, sometimes on prescutellar carinae, scutellum laterally at base more or less restrictedly (sometimes scarcely); tegulae and propleura more or less extensively infuscated; tarsus III with last segment blackish infuscated; flagellum black, with complete white annulus on segments 8-14 or 15, or extreme base of 16; scape ventrally ferruginous red.

FLAGELLUM: Filiform, fairly short, slightly widened beyond middle, with 29-31 segments, the 1st about 1.3 times as long as apically wide, in lateral view the 6th approximately square, the widest on the flat side not quite 1.5 times as wide as long.

HEAD (Fig. 61): Median field of face, lower part of lateral field, and base of clypeus markedly protruding; malar space shorter than width of mandible base; cheeks in lateral view slightly widened from temples toward mandibles, barely convex and slightly receding toward carina genalis; face and clypeus coarsely, irregularly, and sparsely punctured; frons also irregularly

and sparsely but less coarsely punctured. Color as described above; white band on outer orbits gradually expanding downward over almost entire width of cheeks at mandible base; white on facial orbits sometimes lacking; frons, ocellar and occipital regions often blackish infuscated.

THORAX (fig. 62): Notauli indicated only at the extreme base; mesoscutum coarsely and rather densely punctured, polished between punctures; scutellum polished, with a few widely scattered punctures.

LEGS: Coxae III with weak scopa.

ABDOMEN: Ovipositor somewhat projecting.

MALE: Length 8 mm. In addition to white markings of female, white are: scape ventrally, entire clypeus, face and cheeks, mandibles except teeth, pronotal base, usually marks on tegulae, prescutellar carinae and subalarum entirely, sides of scutellum more extensively (sometimes scutellum predominantly), usually a more or less distinct and extensive apical mark on each side of the declivity of propodeum, prosternum, entire mesosternum (the white extending in front more or less onto prepectus, laterally slightly onto mesopleura), coxae and trochanters I and II entirely, coxae III ventrally on inner side, and sometimes base of carina metapleuralis; middle of frons, ocellar and occipital regions, pronotum (except white parts), and outer sutures of mesoscutum predominantly to entirely black; flagellum uniformly black, without annulus; scape ventrally white; tarsi III more or less extensively infuscated.

FLAGELLUM: With 35 segments and with small, roundish (almost hidden by dense pilosity) tyloids on segments about 8-24, rather strongly nodose by prominent, transverse bristle ridges on ventral side.

DISTRIBUTION: (map 120): Cuba (type locality), Jamaica, and Florida. **FLORIDA.** Broward Co.: 1 female, Ft. Lauderdale, 3-II. Dade Co.: 1 female, Homestead, 24-VIII-1949, O. Calkins; 1 female, Miami Springs, I. Lee Co.: 1 female, 3 males, Ft. Myers, 24-VIII-30-X-1968-1971, D. Radtke. Manatee Co.: 1 female, Bradenton, 12-XII; 1 female, Cortez Beach, 4-I-1925, T. Hubbel; 1 male, Palma Sola, 9-III-1966; 1 male, Palmetto, 15-XI. Orange Co.: Orlando, 1 female, 15-IV, 1 male, III-1944, R. and G. Bohart. St. Lucie Co.: 1 female, Ft. Pierce, 30-XI. Volusia Co.: 1 male, Daytona Beach, 5-I-1962; 1 female, Seville, 29-XI. CGH II and FSCA.



Map 120. *Paraditremops albipectus* (Brullé)

34. Genus *Plagiotrypes* Ashmead Fig. 63-66

Plagiotrypes Ashmead, 1900:20. Townes and Townes, 1951:284. Heinrich, 1962:679 (1 species from North America). Townes and Townes, 1966:225 (2 species from Mexico and Bolivia).

Type species: *Ichneumon concinnus* Say; orig. design.

Neopyga Heinrich, 1930:545.

Type species: *Neopyga armata* Heinrich; designated by Townes, 1944.

SYSTEMATICS: This genus obviously represents another Neotropical element, which, in parallel to the preceding genus, has advanced northward with 1 species, into the Nearctic Region. It is distinguished by several striking characters: (1) unidentate, sickle-shaped mandibles (fig. 63, 64); (2) long apophyses of the propodeum (fig. 65); (3) a strange structure of the abdomen of females as described below (fig. 66). None of these

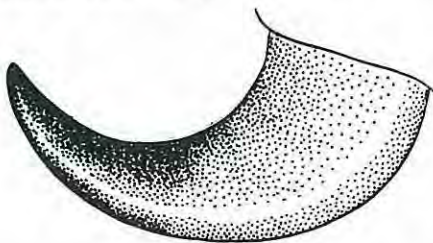


Fig. 63. *Plagiotrypes concinnus* (Say) (female). Mandible, dorsal view.

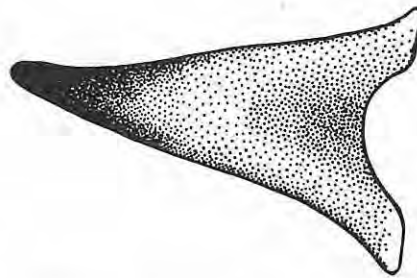


Fig. 64. *Plagiotrypes concinnus* (Say) (female). Mandible, frontal view.

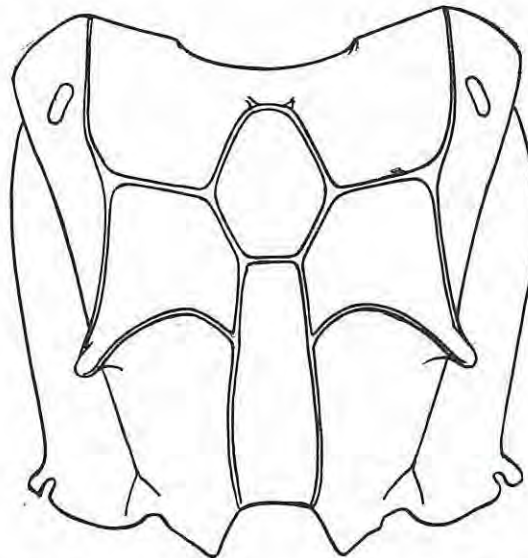


Fig. 65. *Plagiotrypes concinnus* (Say) (female). Propodeum, dorsal view.

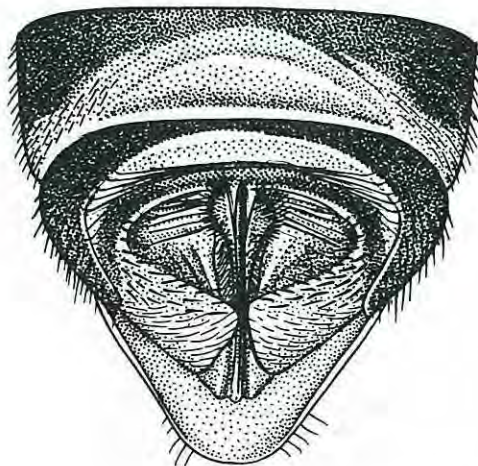


Fig. 66. *Plagiotrypes concinnus* (Say) (female). Abdomen, ventral view.

characters is unique within the subfamily Ichneumoninae, but their combination is. Characters (1) and (2) suggest a relationship to the tribe Acanthojoppini Heinrich, but the

amblypygous abdomen of females, with the emarginate, posterior tergites, as well as the apically not thinned clypeus differ decisively from that tribe. The structure of the abdomen, on the other hand, shows a certain degree of convergency with the African genus *Leptops* Heinrich, placed in the subtribe Cratichneumonina by the author; but *Leptops* has normal mandibles and a quite different head and thorax structure. I do not doubt that *Plagiotrypes* should be placed in the tribe Ichneumonini, but the subtribal position of the genus remains arbitrary and needs further attention and clarification.

MORPHOLOGICAL CHARACTERS

(description based on type species only)

FLAGELLUM: Of females bristle shaped, long, and very slender, apically only very slightly attenuated, with very elongate basal segments, ventrally flattened, and slightly widened toward apex; of males likewise long and slender, with weak indication of some narrow tyloids, segments beyond middle, with distinct subapical, transverse bristle ridges.

HEAD: Temple profile scarcely narrowed behind eyes, distinctly curved; eyes bulging; temples convex; frons not at all concave, with longitudinal furrow below lower ocellus; cheek profile in front view distinctly narrowed toward mandibles; malar space fairly short, in both sexes slightly shorter than width of mandible base; cheeks in lateral view wide and strongly convex, nearly smooth, with sparse, shallow punctures; clypeus with normal, almost straight apical border, laterally rounded and slightly raised, the clypeal foveae large; median field of face slightly protruding, with parallel, fairly distinct, lateral, longitudinal depressions; face and clypeus with moderately dense, shallow puncturation, frons practically impunctate; mandibles (fig. 63, 64) sharply pointed, strongly curved, sickle shaped, unidentate.

THORAX: Mesoscutum fairly short, about as long as medially wide, strongly convex, basal 1/2 of notauli distinct, densely and extremely finely coriaceous, and with shallow, indistinct, fairly dense puncturation, subopaque; sternauli pronounced; scutellum convex, apically somewhat raised above postscutellum (in males slightly more than in females), laterally carinate; propodeum (fig. 65) of subequal length in both sexes, the area posteromedia slightly longer than horizontal part medially; carination strongly prominent and complete; apophyses

very long, narrow, upward curved in females, somewhat shorter in males; area superomedia with costulae in the middle, equally narrowed from costulae toward area basalis and area posteromedia, hexagonal; horizontal part of propodeum nearly smooth, shiny; area posteromedia densely, transversely rugose, as is also posterior part of areae spiraculiferae; speculum large, distinctly convex, shiny and nearly smooth; mesopleura with longitudinal pronounced depression below speculum, their inferior part coarsely and densely rugose punctate; propleura almost smooth.

LEGS: Long and slender; coxae III of females without scopa, ventrally densely punctured, coriaceous between punctures, somewhat shiny.

WINGS: Nervulus interstitial; areolet pentagonal, moderately narrowed in front; radius gently sinuate.

ABDOMEN (fig. 66): Of females slightly elongate, narrow, parallel sided, amblypygous; postpetiole fairly narrow, the median field weakly indicated, shiny, and almost smooth, sometimes with a few punctures, the lateral fields sometimes more densely punctured; gastrocoeli superficial, barely indicated, narrower than their interspace, thyridia recognizable; tergites 2-4 regularly and densely punctured, shiny, tergites 5-7 in females from tergite to tergite apically deeper emarginate, the emargination on the 7th tergite reaching close to anterior border, emarginate parts of tergites membranous, the sclerotized remaining parts of these 3 tergites very finely punctured; hypopygium of females very large and distinctly punctured; ovipositor almost hidden; in males all tergites normal and punctured, the last shallow and less distinct than tergites 2-4; hypopygium of males also large, apically blunt.

CHROMATIC CHARACTERS: The type species is black, with extremely extensive white markings and predominantly fulvous legs; mesoscutum with 2 short, median (apically confluent), white stripes, tergites 1 and 2 basally white, 2-7 (in males) or 2-5 (in females) with apical white bands.

DISTRIBUTION: Neotropical Region, with 1 species ranging into the eastern Nearctic Region as far north as Maine.

1. *Plagiotrypes concinnus* (Say)

Fig. 63-66, Map 121

Ichneumon concinnus Say, 1828:68, female.

Plagiotrypes concinnus, Townes, 1944:321-

322, female. Townes and Townes, 1951:284, female. Heinrich, 1962:680, female.

Holotype: female, Indiana; lost. Neotype: female, "Orange River, Ft. Myers, Fla., Lee Co., 20-XI-71."; USNM (present designation). Neallotype: male, "Archbold Biological Station, Lake Placid, Florida, 19-VI-67."; CGH II.

FEMALE: Length 11 mm. Head, thorax, and abdomen dorsally black, with extensive white markings, ventrally and laterally predominantly white; flagellum black with complete white annulus on segments 7 to 15 or 16; scape uniformly black.

FLAGELLUM: With 31-33 segments, the 1st nearly 5 times as long as apically wide, in lateral view the 15th approximately square, the widest segment on the flat side about 1.5 times as wide as long.

HEAD: White, the following black: a short, longitudinal band on each side of median field of face, apices of mandibles, antennal cavity, middle of frons broadly, ocellar, occipital, and temple regions (the black on temple region not projecting toward margin of eyes), narrow band on malar space, and apical margin of cheeks at mandible base; white orbital band on lower part of outer orbits expanding over entire width of cheeks.

THORAX: Black, the following white: collare, pronotal ridge narrowly (except base), pronotal base broadly, subalarum, tegulae, 2 short, median, apically confluent lines on mesoscutum, scutellum, postscutellum, areae dentiparae with apophyses, areae posteroexternae, area metapleurales, nearly anterior 1/2 of areae spiraculiferae (including spiracles), extreme apex of prosternum, mesopleura predominantly (except the following black: upper, anterior section below subalarum, depression below speculum, mark before coxae II, and anterior marginal area along carina prepectoralis), and mesosternum in somewhat variable extent (usually except anterior blackish median region and blackish patches in front of coxae II).

LEGS: Femora, tibiae, and tarsi light orange ferruginous, tarsi III orange-tinged yellow, tarsi I and II slightly infuscated toward apex; coxae and trochanters I and II entirely white, coxae III and trochanters III white with the following black parts: exterior side and apical section of dorsal side of coxae III, dorsal exterior 1/2 of 1st trochanters III, and 2nd trochanters III on both sides and ventrally (except whitish base), dorsally ferruginous.

ABDOMEN: Black, the following white: petiole, basal band on 2nd tergite (including region of gastrocoeli), regular and even apical bands on tergites 2-5, and the lateral margins of these tergites; the sclerotized lateral parts of the 6th tergite apically also whitish, the membranous parts of tergites 6 and 7 pale, but not white.

MALE: (first description of neallotype). Length 11 mm. Color pattern as in female, with the following few exceptions: no longitudinal, black bands on sides of median field of face, prosternum predominantly, mesosternum entirely white, in addition to white markings on tergites as in female also tergites 6 and 7 with apical, white bands; tarsi III pale yellow; flagellum black, with complete white annulus on segments 10-20; scape ventrally at base with white spot.

FLAGELLUM: With 34 segments, with faint indication of bacilliform tyloids on segments about 9-19.

HEAD: Malar space comparatively slightly shorter than in female.

THORAX: Scutellum somewhat more raised above postscutellum than in female; apophyses of propodeum markedly shorter; rugose sculpture on inferior part of mesopleura considerably coarser.

ABDOMEN: Postpetiole smooth, entirely without punctures; tergites 2, 3, and particularly 4 less densely, less regularly, and less deeply punctured than in female; tergites 4-7 normal, without apical emarginations and membranous quality of apical parts; hypopygium rather long, apically blunt.

DISTRIBUTION (map 121): From Maine (2 females, CHG II) south to central Florida, west to Louisiana. FLORIDA. Alachua Co.: 1 female, 22-X-1951; 1 female, Gainesville, 15-V. Highlands Co.: 1 male, Archbold Biological Station, 19-VI-1967, G. Heinrich. Lee Co.: 3 females, Ft. Myers, 35-26-IV-1971, 20-IX-1971, G. Heinrich, D. Radtke. LOUISIANA. Evangeline Co.: 1 female, Bayou Chicot, 27-X-3-XI-1971, D. Shaneck. Natchitoches Co.: 1 female, Powhatan, 11-VI-1971. G. Heinrich. MISSISSIPPI. Oktibbeha Co.: 1 female, Starkville, 24-30-X-1970, C. Sartor. All specimens in CGH II.

III. Tribe Joppocryptini (Viereck)

Joppocryptinae Viereck, 1918:73

Type genus: *Joppocryptus* Viereck.

Acanthojoppini Heinrich, 1934:65, 67. Heinrich, 1967-1968:26 (key), 433-463.



Map 121. *Plagiotrypes concinnus* (Say)

Type genus: *Eccoptosage* Kriechbaumer (Syn. *Acanthojoppa* Cameron).

Joppini Townes and Townes, 1966:319-323 (partim).

SYSTEMATICS: This tribe is closely related to the preceding Ichneumonini; it is decisively distinguished by a combination of the following 2 structural characters: (1) Clypeus with thinned, leaf-like, and usually either broadly curved or medially projecting (rarely nearly straight) apex; more or less distinctly concave toward apex, usually slightly convex basally. (2) Mandibles appearing sickle shaped, curved, with long, sharply-pointed apical tooth, but also bearing a distinct, though short, subapical tooth which is bent out of the normal, horizontal plane, with apical tooth and is situated nearly in a vertical plane with it.

The Neotropical genus *Lobaegis* Townes, represented by 1 species in the southeastern United States, is uniquely distinguished by the presence of a normal, subapical mandible tooth in addition to the small tooth situated in vertical level with the apical tooth.

DISTRIBUTION: Worldwide; occurring in a fair number of genera and species in the Oriental, Ethiopian, and Neotropical regions; 1 small genus has Holarctic distribution (*Pseudoplatylabus* Smits van Burgst); only 1 Neotropical genus occurs (1 species) in the southeastern states.

35. Genus *Lobaegis* Townes

Lobaegis Townes, 1946:54. Heinrich, 1962: 683-684. (Treatment of *Lobaegis septentrionalis* Heinrich from South Carolina, Virginia, and New York). Townes and Townes, 1966: 222, 319. (5 species from Mexico, 1 species from Brazil, 1 species from Argentina).

Type species: *Ichneumon maritus* Cresson; original designation.

SYSTEMATICS: This genus is uniquely distinguished from all other genera of the tribe and of the subfamily, by the presence of 2 subapical teeth on the mandible, a normal tooth on horizontal level with the longer, apical tooth, and a 2nd, smaller tooth, on vertical level with the apical tooth and visible only on the opened mandible; the structure of the clypeus agrees with the other species of the tribe.

MORPHOLOGICAL CHARACTERS (description based on the North American species only)

FLAGELLUM: Of female bristle shaped, only slightly widened beyond middle; of male long, slightly nodose, with very distinct, transverse bristle ridges on ventral side of segments, and with a row of small, bacilli-form tyloids.

HEAD: Temple profile scarcely narrowed behind eyes, cheek profile slightly narrowed toward mandible base; cheeks and temples in lateral view broad and convex; median field of face strongly protruding and separated from the clypeus by a sharp, transverse furrow; clypeus basally slightly raised, concave toward apex, with a distinct, thinned, median, apical projection covering the labrum.

THORAX: Mesoscutum narrow, medially longer than wide, convex, moderately densely punctured, notauli indicated at base only; scutellum moderately raised above postscutellum, laterally weakly carinate; pronotal ridge somewhat swollen; horizontal part of propodeum medially about as long as area posteromedial; carination distinct and complete, but not strongly prominent; area superomedial parallel sided and longer than wide, with costulae close to anterior end, often not clearly separated from area basalis; areae dentiparae elongate, approximately parallel sided, with distinct apophyses of moderate length.

LEGS: Fairly long and slender.

WINGS: Nervulus interstitial; areolet rhomboidal; radius long.

ABDOMEN: Of female fairly narrow, sharply oxygyous, the ovipositor somewhat projecting; gastrocoeli fairly deeply impressed, with distinct thyridia, approximately triangular, each wider than their interspace; median field of postpetiole indicated, shiny and nearly smooth, the lateral fields with sparse and scattered puncturation; tergites 2-5 in females densely and fairly coarsely punctured, in males also the 6th tergite so sculptured.

DISTRIBUTION: From southeastern North America south to Argentina.

1. *Lobaegis septentrionalis* Heinrich Map 122

Lobaegis septentrionalis Heinrich, 1962:684-685, female, male. Map 122.

Holotype: female, South Carolina; CHT. Allotype: male, South Carolina; CHT.

MALE and FEMALE: Length 11-13 mm. Black, with extremely rich ivory pattern; the following ivory: head (except black antennal cavity, broad middle of frons, ocellar and occipital regions), thorax (except black basic color of mesoscutum, broad, median belt of pronotum from side to side, axillary troughs, basal furrow of propodeum, most of areae superoexternae, dentiparae, and area postero-media, and usually a narrow line below subalarum); scutellum and postscutellum always ivory, often also ivory marks on prescutellar carinae, rarely small ivory marks on exterior margin of mesoscutum between prescutellar carinae and tegulae; all femora, tibiae, and tarsi and the coxae III and trochanters III light orange, except always predominantly or entirely ivory tarsi III; coxae III dorsally and on inner side often ivory tinged or marked; all 1st trochanters dorsally often with infuscated marks; all tergites predominantly black, with percurrent, ivory apical bands, which are somewhat narrowed toward the middle on tergites 3-7; lateral surface of petiole and lateral margins of all tergites ivory; flagellum black, with extensive white annulus.

FLAGELLUM: Of female bristle shaped, long, slightly widened beyond middle, moderately attenuated toward apex, with 38-40 segments, the 1st about 3 times as long as apically wide, in lateral view the 10th approximately square, the widest, on the flat side, about twice as wide as long. Black, with complete white annulus on segments 8 or 9 to 17 or 18; scape black. Of male, with 39-42 segments and with unobtrusive, bacilliform tyloids on segments 6 or 7 to about 20; covered by short pilosity and bearing distinct,



Map 122. *Lobaegis septentrionalis* Heinrich

transverse bristle ridges on ventral side from the 3rd segment on. Black, with complete white annulus on segments 13 (apex) or 14 or 15 to 25 or 26 or 28 scape ventrally ivory.

VARIATION: In one male from Louisiana all femora and tibiae dorsally slightly infuscated and the coxae III with black mark on dorsal side.

DISTRIBUTION (map 122): New York southward to Georgia, westward to Louisiana. GEORGIA. Banks Co.: 1 male, Homer, 13-V-1970, G. Heinrich. Monroe Co.: 1 female, 1 male, Forsyth, 12-VI-15-VII-1969, 1970, G. Heinrich. LOUISIANA. Evangeline Co.: 2 males, Bayou Chicot, 15-V and 25-VIII-1971, G. Heinrich, D. Shaneck. SOUTH CAROLINA. Charleston Co.: 5 females, 3 males, McClellanville, H. and G. Townes (CHT). Pitt Co.: 1 female, Greenville (CHT). Specimens in CGH II unless noted otherwise.

IV. Tribe Listrodromini (Foerster)

Listrodromoidae Foerster, 1868:144.

Listrodromini Ashmead, 1895:278. Heinrich, 1962:687-696.

SYSTEMATICS: This tribe is particularly characterized by a peculiar structure of the head: face, clypeus, and malar space together form 1 continuous, slightly convex plane, without recognizable depressions or elevations separating the face from the clypeus and the malar space and median field of face.

from the lateral fields. An additional, decisive character is represented by the structure of mandibles, which are short and wide, bearing 2 subequal teeth, separated from each other by a wide gap. The combination of these 2 characters is shared by the Ischnojoppini and by the Compsophorini (Ethiopian and Oriental Regions). The Listrodromini differ from these 2 tribes mainly by the structure of the propodeum, which is abbreviated. The restriction to Lycaenidae as their hosts also is considered as a distinctive tribal character of the Listrodromini.

DISTRIBUTION: With a restricted number of species distributed over the Holarctic and Indo-Australian Regions; represented by a fair number of species in the Ethiopian Region, and also recorded in 2 genera from the Neotropical Region (Townes and Townes, 1966:271-273); whether the Neotropical forms belong indeed to the Listrodromini (*sensu stricto*), in spite of their structural correspondence with them, needs further confirmation by biological characters, particularly host records.

HOSTS: All species of the Holarctic Region and the Ethiopian Region are, as far as is known, parasites of Lycaenidae (Rhopalocera).

36. Genus *Anisobas* Wesmael

Anisobas Wesmael, 1844:111, 145. Heinrich, 1934:108-110 (2 species from Celebes). Townes and Townes, 1951:282 (4 Nearctic species). Townes, et al., 1961:391 (1 species with questionable generic position from Celebes; *Lycaeniphilos* Heinrich as synonym). Heinrich, 1962:690-696 (5 Nearctic species). Townes, et al., 1965:509-510 (4 eastern Palearctic species).

Type species: (*Ichneumon cingulatorius* Wesmael) = *Ichneumon cingulatorius* Graenicher; designated by Ashmead, 1900.

SYSTEMATICS: This genus is distinguished from all other genera recorded from the Nearctic Region by a peculiar structure of the collare: the transverse furrow of the latter is medially interrupted by a distinct elevation.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females fairly short, with less to little more than 30 segments, always bristle shaped and not, or scarcely widened beyond middle; of males with a row of distinct tyloids and without transverse bristle ridges.

HEAD: Wide; temple profile not or slightly narrowed behind eyes; malar space in

females usually nearly as long as width of mandible base; apical border of clypeus straight or very slightly emarginate.

THORAX: Transverse furrow behind collare with pronounced median elevation; scutellum more or less strongly raised above postscutellum, laterally more or less extensively carinate; mesoscutum short, not longer than wide, convex, the notauli subobsolete; propodeum abbreviated, the horizontal part always markedly shorter than the area posteromedia, the area superomedia usually wider than long.

WINGS: Areolet narrowed in front, but clearly pentagonal; radius fairly short and straight.

LEGS: Rather short; claws not pectinate.

ABDOMEN: Of females usually rather short, oval, apically blunt, semiamblypygous; ovipositor not projecting; median field of postpetiole not clearly defined, but indicated by elevation, often with median depression, usually with a few scattered punctures; gastrocoeli of moderate size, distinctly deepened, with fairly distinct thyridia; tergites 2-3 or to 4 fairly coarsely punctured.

DISTRIBUTION: Holarctic Region.

HOSTS: Lycaenidae.

1. *Anisobas texensis* (Ashmead)

Map 123

Cryptus texensis Ashmead, 1890:410, "male" = female.

Anisobas texensis Townes and Townes, 1951:282, female, partim. Heinrich, 1962:694-695, female.

Holotype: female, Texas; USNM.

SYSTEMATICS: This species is most similar to *luzernensis* Bradley (from the northeastern states), but females differ in structure mainly by the somewhat longer flagellum which is apically longer and more strongly attenuated, and in color by black tergites 4-7 with conspicuous, apical white bands (in *luzernensis* only tergites 5-7 apically extensively white banded, the 4th tergite predominantly red).

FEMALE: Length 9-10 mm. Head and thorax black except the following white markings: facial orbits, frontal orbits up to level with lower ocellus, temple orbits (down to, or slightly beyond, middle of posterior margin of eyes), pronotal ridge, subalarum, and scutellum (except black base and apex); tergites 1-3 uniformly red, 4-7 black, with conspicuous apical white bands; legs red, the following black: all coxae and trochanters,

apices of femora III, tarsi III, and tibiae III (except reddish section beyond base); flagellum black with dorsal white annulus on segments 6 or apex of 6 to 11 or 12.

FLAGELLUM: Bristle shaped, fairly long, considerably attenuated toward apex, not widened beyond middle, with 29-30 segments, the 1st about 3.5 times as long as apically wide, none tangibly wider than long on the flat side.

HEAD: Temple profile not narrowed behind eyes, strongly curved; malar space nearly as long as width of mandible base; scutellum considerably raised above postscutellum, strongly convex, slanting down toward postscutellum in a gradual curve, laterally carinate to about middle; area superomedia transverse, much wider than long, apically emarginate.

DISTRIBUTION (map 123): Texas, Georgia, and Tennessee. **GEORGIA.** Monroe Co.: 1 female, Forsyth, 28-V-4-VI-1970, G. Heinrich. **TENNESSEE.** Henderson Co.: 2 females, Natchez Trail State Park, 3-17-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

HOSTS: ? *Callophrys* (*Incisalia*) *niphon* (Hubner) (Heinrich, 1962).

2. *Anisobas angustior* Heinrich

Anisobas angustior Heinrich, 1975, SNIS, Suppl. 5, Nat. Canad. 102:780-781, female.

Holotype: female, Newfoundland, CGH II.



Map 123. *Anisobas texensis* (Ashmead)

FEMALE: In size, structure, and white markings of head and thorax identical with *texensis*, but abdomen markedly narrower and more elongate, the 3rd and 4th tergite only about 3 times as wide as long (4 times as wide as long in *texensis*). Basic color of tergites 4-7 light red in holotype, black in the specimen from Tennessee (probably subspecific difference). In contrast to *texensis*, 4th tergite without or with narrow and indistinct apical white margin. Tibiae III predominantly red.

DISTRIBUTION: Newfoundland and Tennessee. **TENNESSEE.** Henderson Co.: 1 female, Natchez Trail State Park, 13-17-VIII-1972. CGH II.

V. Tribe Platylabini Berthoumieu

Platylabini Berthoumieu, 1904:4.

Type genus: *Platylabus* Wesmael.

SYSTEMATICS: On the peninsula of Florida this tribe is represented by 2 species, both from the most northern part of the State. In the Austroriparian Zone of the neighboring land areas the Platylabini are also rather poorly represented. The paucity, or even absence, of species of this tribe in subtropical and tropical lowlands seems to be the general rule, confirmed also by my observations during many years of studies of the fauna of east and west Africa, the Malayan Islands, and Burma.

This is, by morphological as well as biological characters, 1 of the most clearly defined tribes of the subfamily. Distinguished, in the great majority of forms, by the combination of structural features: (1) the distinctly convex clypeus and (2) the more or less widened and dorsally flattened petiole. The shape and size of the spiracles of the propodeum vary generically from long and slit shaped to small and circular; the structure of gastrocoeli varies from large and transverse with narrow interspace, to obsolete; the apex of abdomen of females seems to be amblypygous without exception; the scutellum is usually more or less elevated and laterally carinate; apices of areae dentiparae tend to form more or less pronounced projections.

DISTRIBUTION: Worldwide.

HOSTS: Geometridae and Drepanidae (very few species).

Key to genera of Platylabini of Florida and neighboring land areas

1. Propodeum with long, pointed apophyses in both sexes; hypopygium of

males bipartite; area superomedia and area basalis not separated but forming together a gradually widened toward scutellum central area. (Abdomen of females predominantly orange, of males black with apical ivory bands on all tergites).

. 38. *Ambloplisus* Heinrich

- Propodeum without long apophyses, at the most with short, tooth-like projections; hypopygium of males not bipartite; area superomedia otherwise shaped. 2

2. Spiracles of propodeum considerably longer than wide. (Gastrocoeli large and rather deep, with narrow interspace; all species recorded so far from the southeastern states are metallic blue and fairly large, (13-16 mm long).

. 37. *Platylabus* Wesmael

- Spiracles of propodeum small and circular. (Small species, 6-8 mm long, of red or orange basic color). 3

3. Gastrocoeli transverse and rather distinct; median field of face strongly protruding; mesoscutum and tergites 2-4 coarsely and densely punctured; in females tergites 6 and 7 retracted under the 5th tergite.

. 41. *Apaeleticus* Wesmael

- Gastrocoeli superficial and not transverse; median field of face less protruding; mesoscutum and tergites 2-4 of much finer, coriaceous-punctate sculpture; apical tergites of female not retracted. 4

4. Gastrocoeli represented by a narrow and superficial, oblique, longitudinal depression, bearing some coarse, irregular, longitudinal rugae, their interspace and about anterior 1/2 of 2nd tergite coarsely and densely irregularly rugose; areolet clearly pentagonal. (Anterior tergites ferruginous, posterior tergites black with apical white margins).

. 39. *Linytus* Cameron

- Gastrocoeli superficial, each about as wide as their interspace; basal part of 2nd tergite, including space of gastrocoeli, without rugosity; areolet rhomboidal. (Abdomen uniformly pale orange).

. 40. *Neolinytus* Heinrich

37. Genus *Platylabus* Wesmael

Platylabus Wesmael, 1844:150, 153. Townes, et al., 1961:396, (14 Indo-Austr. species). Heinrich, 1962:698-754 (40 North American

species). Townes, et al., 1965:515 (10 east. Pal. species). Townes and Townes, 1966:273-274 (7 species from Mexico and Guatemala). Heinrich, 1967-1968:396, 397 (1 Ethiopian species).

Type species: *Platylabus rufus* Wesmael; designated by Ashmead, 1900.

SYSTEMATICS: This is the largest genus of the tribe Platylabini. Only 1 out of the 40 recorded North American species, has reached the northwestern corner of Florida. The genus is distinguished by the combination of the following 3 characters: (1) Spiracles of propodeum not circular, but clearly longer than wide (though in a few, small species, approaching a circular outline). (2) Propodeum without apophyses, at the most the apex of areae dentiparae pointed. (3) Gastrocoeli transverse, with large thyridia, fairly deeply impressed, each usually considerably wider than their interspace. (A few species with gastrocoeli and thyridia as wide as, or even slightly narrower than their interspace are included in this genus; none of these species has been recorded from the southeastern states).

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, very long and slender, extremely attenuated apically, not or moderately widened beyond middle; of males as a rule without tyloids (rarely with rudimental, punctiform or bacilliform tyloids).

HEAD: Temple profile and cheek profile usually (distinctly to considerably) narrowed; clypeus always convex, mandibles slender, with delicate teeth.

THORAX: Mesoscutum convex, more or less densely punctured, in a few species opaque; scutellum strongly raised above postscutellum and laterally carinate; area superomedia approaching a square or rectangular shape, costulae lacking; apices of areae dentiparae tending to form short projections in some species, however, without real apophyses.

LEGS: Moderately long and slender; tarsi III of females often somewhat abbreviated.

WINGS: Nervulus usually interstitial; areola as a rule rhomboidal; radius straight or nearly so.

ABDOMEN: Of females amblypygous, usually broadly oval and flat, the 2nd tergite not longer than apically wide; petiole clearly wider than high; postpetiole with indistinct, median field, which is irregularly rugose to nearly smooth and never aciculate; gastrocoeli as described above.

DISTRIBUTION: The genus *Platylabus* inhabits the Holarctic and Indo-Australian Regions. One species recorded from the Ethiopian Region; 7 species from Mexico and Guatemala.

HOSTS: Almost exclusively Geometridae. Only 2 European species have been recorded from other hosts (*Drepana*).

Key to species of *Platylabus* Wesmael of Florida and neighboring land areas

Females

1. Postpetiole and femora III with apical, yellow band; cheeks with malar space yellow. (Basic color bright light metallic blue; sculpture of tergites finer than in alternative species; length 15 mm)
..... 2. *flavidoclarus*, new species
- Postpetiole and femora III apically not yellow; cheeks with malar space not yellow. (Basic color a shade darker blue; sculpture of tergites coarser).
..... 2
2. Flagellum on the flat side somewhat widened; large species, 13-15 mm long.
..... 1. *clarus* (Cresson)
- Flagellum on the flat side not at all widened; smaller species, 9.5-10.5 mm long.
..... 3. *hyperetis* Heinrich

Males

1. Flagellum without annulus; white stripe on outer orbits gradually widening downward over nearly entire width of cheeks; length 14-16 mm.
..... 1. *clarus* (Cresson)
- Flagellum with broad white annulus; white stripe on outer orbits reduced to a short line on about their middle; length 10.5-11 mm.
..... 3. *hyperetis* Heinrich

1. *Platylabus clarus* (Cresson)

Map 124

Ichneumon clarus Cresson, 1867:201, female. *Platylabus magnificus* Provancher, 1886:36, female. *Platylabus clarus*, Heinrich, 1962: 705-707, female, male.

Holotypes: *Ichneumon clarus*, female, New Hampshire; ANS. *Platylabus magnificus*, female, Canada; PMQ. Neallotype: male, Dryden, Maine; CGH II.

SYSTEMATICS: The group of species with striking, metallic-blue, basic color of the entire body (*Lamprojoppa* Cameron) is represented by 4 species in the Nearctic Region, a 5th will be added below. Among the

4 species known so far from the northeastern region, *clarus* is the largest. Females are chromatically distinguished by richer ivory markings on the thorax, which include at least part of the scutellum, usually also pronotal ridge entirely or partially and sometimes 2 short, median lines on the mesoscutum. Males are distinguished by the lack of white flagellar annulus; they share this character only with the species *divisatae* Heinrich, not recorded south of Quebec.

FEMALE: Length 13-15 mm. Metallic blue; apical 1/3 to 3/4 of scutellum always ivory, often also the postscutellum and pronotal ridge; sometimes collare, median marks on mesoscutum, and tegulae ivory, always stripe on outer orbits, the inner orbits, and subalarum; flagellum black, with white annulus on segments 7 or 8 to 12 or 13.

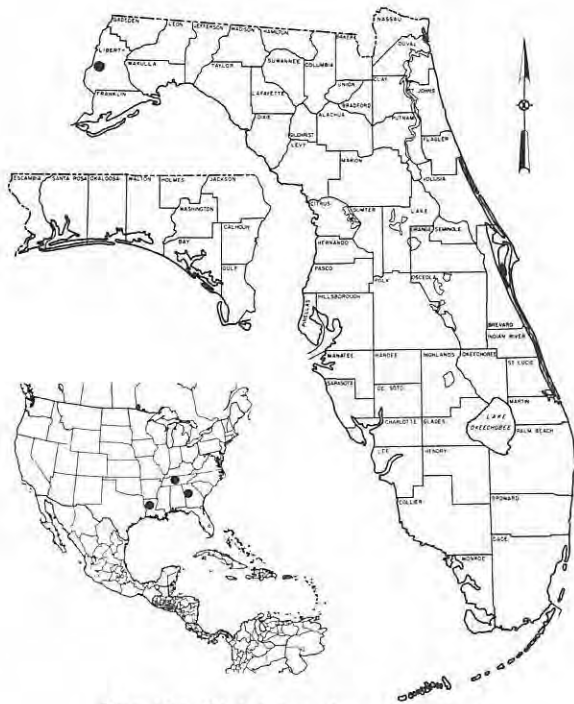
FLAGELLUM: Bristle shaped, very long, ventrally flattened beyond middle and slightly widened, apically extremely long and finely attenuated, with hair-thin apical end, with 40-46 segments, the 1st more than 3 times as long as wide, the 14th square, the widest 1.5 to 2.5 times as wide as long.

HEAD: Occiput slanting down immediately from hind rim of eyes and hind ocelli in a moderately steep, even, and straight slope; temple profile moderately narrowed behind eyes, almost straight; malar space about as long as width of mandible base.

THORAX: Mesoscutum considerably longer than medially wide, evenly and densely punctured all over; notauli indicated by shallow, longitudinal depressions; scutellum strongly convex, with gradually curved down apical slope and highly raised, lateral carinae; area superomedia about as wide as long, quadrangular, usually somewhat narrowed toward apex; areae dentiparae with distinct, though small, tooth-like projections; costulae and carinae coxales lacking.

LEGS: Tarsi laterally slightly compressed, each segment somewhat swollen apically; metatarsus III much longer than the 4 following segments together.

MALE: Length 14-16 mm. Flagellum without annulus; metallic blue; white stripe on outer orbits gradually widening downward over nearly entire surface of lower part of cheeks down to mandible base; white are also: face and clypeus entirely, frontal orbits, malar space, collare, pronotal ridge, subalarum, tegulae at least in part, apex of scutellum, often postscutellum, sometimes (present in all southeastern specimens) 2 short, median lines on mesoscutum, coxae I



Map 124. *Platylabus clarus* (Cresson)

and II extensively to predominantly, usually also ventro-apical mark on coxae III, anterior side of legs I and II extensively to entirely (except 2nd trochanters), sometimes also stripe on exterior side of tibiae III, and (in southeastern specimens) band along margin of prepectus.

DISTRIBUTION (map 124): From southeastern Canada south to northern Florida, west to Louisiana and Tennessee. **FLORIDA.** Liberty Co.: 1 male, Torreya State Park, 23-V-1970, H. V. Weems, Jr. **GEORGIA.** Monroe Co.: 1 female, Forsyth, 16-23-VI-1970, 1 male and 1 female, 23-V-1970, G. Heinrich. **LOUISIANA.** Natchitoches Co.: 1 male, Natchez Trail State Park, 1-9-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

2. *Platylabus flavidoclarus*, new species Map 125

SYSTEMATICS: The type is distinguished by a striking, bright, and brilliant blue, basic color of the entire body, by extensive yellow markings which include an apical band on the postpetiole, the apices of all femora, a bipartite median mark on the mesoscutum, and a marginal band on the prosternum. Furthermore the sculpture of the abdomen, particularly of tergites 2-4, is considerably finer than in typical specimens of *clarus*,

nearly smooth on the 3rd and practically smooth and shiny on the 4th tergite, and the tarsi III, particularly the metatarsus III, are longer and more slender than in *clarus*. I assume that the specimen represents a distinct form, but cannot be quite sure whether a full species or a subspecies of *clarus*; supposing the latter, the sympatric male recorded from Louisiana would have to be considered as associated with this subspecies; this male is, however, undistinguishable from males of northeastern populations and from the *clarus* males recorded from Georgia and Tennessee as well, in which states also typical *clarus* females have been found. I prefer, therefore, to treat this form tentatively as a full species. The clarification of the case needs further investigation.

FEMALE: Length 15 mm. Very bright, and brilliant, metallic blue; the following lemon yellow: sides of clypeus and of face, orbits around eyes (broad on frons, narrow on temples, widened below over entire width of cheeks and malar space), labrum, mandible base, collare, entire pronotal ridge, subalarum, tegulae in part, band along lower margin of prepectus, dorsal surface of scutellum except basally, postscutellum, bipartite median mark on mesoscutum, apical band on postpetiole, coxae I and II and 1st trochanters I and II apically, ventro-apical margin on coxae III, apices of all femora, anterior side of tibiae I, basal 1/2 and apex of tibiae II on anterior side, median stripe on exterior side of tibiae III.

FLAGELLUM: As described for *clarus*; with 44 segments. Black, with complete white annulus on segments 6 (apex) to 14; scape ventro-apically white.

HEAD, THORAX, LEGS, AND ABDOMEN: As in *clarus*, except for the differences described in systematics, above.

Holotype: female, Louisiana, Evangeline Co., Chicot, 24-V-1971, G. Heinrich (CGH II).

DISTRIBUTION (map 125): Known only from the type locality.

3. *Platylabus hyperetis* Heinrich Map 126

Platylabus hyperetis Heinrich, 1962:707-709, female, male.

Holotype: female, Maine; CGH II. **Allotype:** male, Maine; CGH II.

SYSTEMATICS: The 3 males from Arkansas agree very well with specimens from Maine, except for a slight increase of yellow



Map 125. *Platylabus flavidoclarus*, n. sp.

on anterior side of femora II, and in 2 specimens, a faint yellow mark also on exterior side of tibiae III and on postscutellum.

FEMALE: Length 9.5-10.5 mm. Metallic blue; white marks of head as in *clarus*, of thorax considerably more restricted than in *clarus*: only apical mark on scutellum and the subalarum white.

FLAGELLUM: Long and very slender, ventrally flattened beyond middle, but, in contrast to *clarus* and *metallicus* Bradley, not at all widened, extremely attenuated apically, with 38-40 segments. Black, with white annulus on segments 8-12 or 13.

HEAD: Occiput slanting from hind rim of eyes and ocelli in a very slightly convex curve, not in a quite even and straight slope; temple profile moderately narrowed behind eyes, distinctly curved; malar space about as long as width of mandible base.

THORAX: Almost as in *clarus*; depression of notauli scarcely indicated, mesoscutum and scutellum on the average, slightly shorter; toothlike projections of areae dentiparae considerably less prominent than in *clarus*; area superomedia parallel sided and slightly longer than wide.

LEGS: Femora III a little stouter than in *clarus*.

ABDOMEN: Apex of abdomen and hypopygium as in *clarus*; sculpture of base of 2nd

tergite finely punctured, finely coriaceous between punctures.

MALE: Length 10.5 to 11 mm. Metallic blue; the following ivory: face and clypeus entirely, frontal orbits up to nearly level with lower ocellus, short stripe on middle of outer orbits, malar space, mandibles except teeth, usually a mark on collar and extreme apex of pronotal ridge, subalarum, tegulae in part or entirely, apical 1/2 or 1/3 of scutellum, sometimes postscutellum and border of prepectus, anterior side of femora I, anterior side of femora II at apex only or predominantly, coxae and 1st trochanters I and II ventrally, the former except base, rarely indistinct mark on exterior side of tibiae III; flagellum black, with complete white annulus on segments 9 or 10 or 11 to 15 or 16; scape ventrally white.

FLAGELLUM: Tiny, bacilliform tyloids recognizable on white segments.

DISTRIBUTION (map 126): British Columbia, Maine, and Arkansas. ARKANSAS. Garland Co.: 3 males, 11-29-V-1972, G. Heinrich (CGH II).

HOSTS: *Hyperetis amicaria* (H.S.) in British Columbia.

38. Genus *Ambloplisus* Heinrich

Ambloplisus Heinrich, 1930:551. Heinrich, 1962:789-790. Townes and Townes, 1966:274-275 (2 species from Mexico and Peru).



Map 126. *Platylabus hyperetis* Heinrich

Type species: *Hoplismenus ornatus* Cresson (original designation).

SYSTEMATICS: A genus particularly distinguished by 2 striking characters: the long, pointed apophyses of the propodeum in both sexes, and by the more or less prolonged and apically bipartite hypopygium in males. Additional generic features are presented by the shape of the head, with very steeply sloping, almost obsolete temples, by the delicate mandibles, and particularly by the carination of propodeum (see below).

The structure of gastrocoeli separates *Ambloplisus* from *Tropicolabus* Heinrich.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, long and slender, ventrally flattened but not, or barely, widened beyond middle, considerably attenuated at apex; of males without tyloids and without incisions between segments.

HEAD: Temples extremely narrowed, occipital region and temple region sloping nearly perpendicularly downward immediately from hind border of eyes and ocelli; clypeus moderately convex; mandibles very delicate, strongly narrowed behind base, the lower tooth slightly bent inward and out of level with the upper.

THORAX: Mesoscutum longer than wide, the notauli slightly indicated at the base only; scutellum as in *Platylabus*, distinctly raised above postscutellum, dorsally convex, with distinct, lateral carinae; horizontal part of propodeum medially nearly as long as area posteromedia in females, comparatively somewhat shorter in males; areae dentiparae apically drawn out into long apophyses in both sexes; area superomedia usually longer than wide, approximately parallel sided, apically usually closed by a strong, transverse carina, but often not separated in front from the area basalis; costulae and carinae coxales absent.

LEGS: Long, moderately slender.

WINGS: Nervulus interstitial; areolet irregularly rhomboidal, the intercubiti coalescent in front; radius long, slightly curved.

ABDOMEN: Petiolus slightly, sometimes scarcely wider than high; postpetiole with weakly indicated, irregularly, finely-rugose, median field; gastrocoeli shallow, comparatively small, sometimes indistinct, with distinct thyridia, their interspace considerably wider than 1 of them; tergites 2 and 3 finely coriaceous, without distinct punctation, subopaque; hypopygium of males more or less prolonged and bipartite.

DISTRIBUTION: Neotropical Region and southeastern North America north to Idaho and New York.

1. *Ambloplisus ornatus* (Cresson)

Map 127

Hoplismenus ornatus Cresson, 1868:92, female.

Thaumatoteles ornatus, Hopper, 1938:103, female. Townes and Townes, 1951:281.

Ambloplisus ornatus, Heinrich, 1962:790-791, female, male.

Holotype: female, New York; ANS. Neallotype: male, North Carolina; CHT.

SYSTEMATICS: The specimens from Florida have been compared with the holotype of *Ichneumon mendicus* Cresson, described 1873 from Orizaba, Mexico; the type is a female and agrees in the complicated color pattern of head and thorax almost completely with the species *ornatus*; the abdomen, however, is black with ivory apical bands on all tergites, this way displaying the coloration of the male of the latter species, but strikingly different from its associated sex. I must assume, therefore, that *mendicus* is a distinct species. The 2 specimens recorded from Florida were caught on the same small bush, 1st the female, shortly thereafter, the male. This definitely confirms the association of sexes, as tentatively assumed and discussed by Heinrich (1962).

FEMALE: Length 9 mm. Head and thorax black, with rich ivory markings as described below; abdomen orange red, tergites 1-3 with irregular, more or less distinct, latero-apical, yellowish markings; legs orange red with white parts; white are: tarsi III, trochanters and coxae I and II predominantly, trochanters III partially, and coxae III basally on dorsal side.

FLAGELLUM: Black, with complete, white annulus on segments 6 or 8 to 12.

HEAD: Ivory, the following black: antennal cavity, middle of frons, ocellar and occipital regions, and median field of face (in specimen from Florida the latter partially white); mandibles black with basal white mark.

THORAX: Mesoscutum evenly, densely, and fairly strongly punctured, finely coriaceous between punctures, somewhat shiny; spiracles of propodeum rather small, short oval; area superomedia confluent with the considerably deepened area basalis, forming a somewhat longer than wide, gradually

slightly widened toward postscutellum, central area, with strong and straight, lateral, and apical carinae. Black; the following ivory: collare, pronotal ridge and pronotal base broadly, subalarum, 2 long, median lines on mesoscutum (continuous to its anterior border), 2 long lateral lines on mesoscutum along the entire, exterior border of lateral lobes, prescutellar carinae, scutellum, postscutellum, median mark on propleura, mesopleura almost entirely (except narrow, black band below subalarum and black foveae below speculum), metapleura entirely, carinal triangle, declivity of propodeum including the apophyses (except most of area posteromedial black), apical part of prosternum, and in specimen from Florida, mesosternum extensively.

MALE: Length 8 mm. Black, with extremely rich ivory markings; abdomen in contrast to female black, all tergites with apical, ivory bands; ivory pattern on head and thorax as in female, except that the median field of face is entirely ivory and that the exterior belt of prepectus is also ivory in the specimen from Florida; legs as in female, except coxae I and II and all trochanters uniformly white, the coxae III on dorsal side more extensively and also on ventral side white; coxae III and tibiae III dorso-apically black in the specimen from Florida; flagellum with 34-35 segments; black, with complete white annulus on segments 9 or 10 to 16; scape ventrally white.

DISTRIBUTION (map 127): New York (type locality), New Jersey, Maryland, North Carolina, Idaho, and northern Florida. **FLORIDA.** Clay Co.: 1 female, 1 male, Gold Head Branch State Park, 3-V-1971, C. F. Zeiger, D. Radtke (CGH II).

39. Genus *Linycus* Cameron

Linycus Cameron, 1903a:234. Townes, et al., 1961:394. Heinrich, 1962:777-778. Townes and Townes, 1966:273 (1 species from Mexico).

Type species: *Linycus rufipes* Cameron; monobasic.

Erythroischnus Cameron, 1904c:252.

Type species: *Erythroischnus annulicornis* Cameron; monobasic.

SYSTEMATICS: The genus agrees in the small, circular spiracles of the propodeum with the following 4 genera of the tribe Platylabini: *Neolinycus* Heinrich, *Apaeleticus* Wesmael, *Ectopius* Wesmael, and *Cyclobabus* Heinrich, being apparently most closely related to the latter. It differs from all



Map 127. *Ambloplitis ornatus* (Cresson)

of them by a peculiar structure of the gastrocoeli, which are represented only by a narrow and shallow, oblique, longitudinal depression, bearing some coarse, irregular, longitudinal rugae. There are additional characters which distinguish *Linycus* from the other genera, given in the following description.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females very slender, long, bristle shaped, not widened beyond middle, strongly attenuated toward apex, with elongate, basal segments, all segments considerably longer than wide. Of males without tyloids, covered by short, stiff hair, segments of apical 1/3 well separated from each other by clefts.

HEAD: Temple profile and cheek profile markedly narrowed behind eyes and toward mandible base respectively, the former slightly curved; median field of face slightly protruding; clypeus less strongly convex than in *Neolinycus*; mandibles normal, moderately narrowed behind base; frons, face, and clypeus densely and coarsely punctured.

THORAX: Mesoscutum coarsely and very densely punctured; sternauli pronounced on the mesosternum, notauli likewise pronounced from the base of the mesoscutum to beyond its middle; scutellum strongly convex and strongly raised above postscutellum, strongly carinate laterally for its entire

length; propodeum with complete and sharp carination, except carinae coxales, coarsely irregularly rugose, the horizontal part medially considerably shorter than the area posteromedia; area superomedia pentagonal, with costulae approximately in the middle, somewhat narrowed toward area basalis, usually also slightly narrowed toward area posteromedia, usually, particularly in males, wider than long; area basalis depressed; areae dentiparae with small, toothlike projections.

LEGS: Moderately long and slender.

WINGS: Nervulus interstitial; areolet practically rhomboidal, the intercubiti almost coalescent in front; radius straight.

ABDOMEN: Postpetiole with fairly well delimited, median field, coarsely irregularly rugose, the median field sometimes longitudinally rugose; gastrocoeli as described in systematics, their interspace and about anterior 1/2 of 2nd tergite very coarsely and densely, irregularly rugose, the rest of the 2nd tergite and the entire 3rd coarsely and densely punctured, coriaceous between punctures, slightly shiny.

DISTRIBUTION: Ceylon, Mexico, Holarctic Region.

HOSTS: The genera *Dysstroma* (Geometridae and *Depressaria* (Decophoridae) have been recorded as hosts of the Palearctic species *exhortator* Fabricius. No hosts records yet of the Nearctic subspecies.

1. *Linycus exhortator thoracicus* (Cresson) Map 128

Hoplismenus thoracicus Cresson, 1864:288, "male" = female.

Ectopius thoracicus, Townes and Townes, 1951:282, "male."

Ectopius exhortator thoracicus, Heinrich, 1956b:651, 652, female, male.

Linycus exhortator thoracicus, Heinrich, 1962:780, female, male.

Holotype: female (nec male), Pennsylvania; ANS.

FEMALE: Length 7-8 mm. Head uniformly black; thorax ferruginous, except the following black: pronotum, mesoscutum, and usually a patch below subalarum; subalarum often white; abdomen tricolored: tergites 1 and 2 uniformly ferruginous, sometimes also the 3rd basally more or less extensively, the following tergites entirely black, 5-7 with medio-apical white bands; coxae ferruginous; coxae I sometimes, all 1st trochanters

usually more or less infuscated; femora, tibiae and tarsi III black or blackish infuscated, tibiae III beyond base usually with dark, ferruginous section, femora III often basally ferruginous; femora I and II sometimes more or less extensively infuscated; tibiae and tarsi I and II ferruginous; flagellum tricolored: black, with not quite complete, broad, white annulus and with ferruginous basal segments.

MALE: Length 7-8 mm. In addition to black parts of thorax described for female also prosternum and prepectus black, sometimes also mesosternum partially; the 3rd tergite usually predominantly ferruginous; all femora ferruginous, the femora III only apically black; tibiae III narrowly infuscated at base, broadly at apex, tarsi III blackish; 1st trochanters not or barely infuscated; flagellum black, with not quite complete, broad, white annulus, the basal segments only ventrally ferruginous; otherwise like female.

DISTRIBUTION (map 128): From Michigan and Ontario south to Georgia and Tennessee. **GEORGIA.** Monroe Co.: 1 female, 3 males, Forsyth, 23-V-31-VII-1969, 1970, G. Heinrich, F. Naumann. **TENNESSEE.** Henderson Co.: 3 females, 6 males, Natchez Trail State Park, 1-14-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.



Map 128. *Linycus exhortator thoracicus* (Cresson)

40. Genus *Neolinycus* Heinrich

Neolinycus Heinrich, 1971:1025-1026.

Type species: *Neolinycus michaelis* Heinrich.

SYSTEMATICS: The type species shares the small, circular spiracles of the propodeum with only 3 related genera from the Nearctic Region: *Cyclolabus* Heinrich, *Lyncus* Cameron, and *Apaeleticus* Wesmael. It differs decisively and generically from all of them as follows: from *Cyclolabus* (as also from *Apaeleticus*) by structure of gastrocoeli and thyridia, which are neither deeply impressed nor transverse but superficial and narrower than their interspace; from *Apaeleticus* in addition by (1) not coarsely, irregularly rugose propodeum (which is finely sculptured instead), (2) by impunctate, finely coriaceous-rugose, median field of postpetiole, and (3) by not protruding median field of face; from *Lyncus* (1) by a peculiar head structure, with strongly-reduced, practically-absent, temple profile, the temples sloping down abruptly and almost perpendicularly from the hind margin of eyes; (2) by rhomboidal areolet (clearly pentagonal in *Lyncus*), and (3) by structure of gastrocoeli, which are not as in the latter genus indicated by a longitudinal, very strongly and characteristically, irregularly rugose, slight depression.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Very slender and long, bristle shaped, not the least widened beyond middle, with elongate, basal segments, strongly attenuated apically.

HEAD: Occiput and temples abruptly and steeply sloping from eyes and ocelli; cheeks narrow and receding toward carina genalis; cheek profile in frontal view very strongly narrowed toward base of mandibles, the latter strongly narrowed behind base, with very small apical teeth; malar space longer than width of mandible base; clypeus strongly convex; median field of face barely protruding.

THORAX: Mesoscutum slightly longer than wide, densely punctured, finely coriaceous between punctures, shiny; anterior 1/3 of notauli distinct, sternauli on the mesosternum pronounced; scutellum moderately convex, gradually narrowed toward apex, with strong lateral carinae; propodeum finely sculptured, moderately short, the horizontal part medially considerably shorter than area posteromedia; carination distinct and complete, only carinae coxales obsolete; area basalis deepened; area superomedia hexagonal, with costulae approxi-

mately in the middle, narrowed toward area basalis; areae dentiparae elongate and slanting, apically barely projecting.

LEGS: Moderately long and slender.

WINGS: Areolet rhomboidal, the intercubiti coalescent in front; nervulus interstitial.

ABDOMEN: Petiole flat, slightly wider than high, gradually widening into postpetiole, the latter with weakly indicated, median field and some fine, irregular rugosity; gastrocoeli shallow, each about as wide as their interspace, with fairly distinct thyridia; tergites 2-5 densely and evenly, fairly strongly punctured, somewhat shiny.

DISTRIBUTION: Southeastern Nearctic Region.

1a. *Neolinycus michaelis* *michaelis* Heinrich

Map 129

Neolinycus michaelis Heinrich, 1971:1025-1026, female. Heinrich, 1972:210, male.

Holotype: female, Water Valley, Lafayette Co., Mississippi; CGH II. Neolotype: male, Powhatan, Natchitoches Co., Louisiana; CGH II.

FEMALE: Length 6 mm. Head ivory, ocellar, occipital, and sometimes temple regions black, antennal cavity, middle of frons, and cheeks along carina genalis orange, often middle of face and of clypeus faintly orange tinged; basic color of mesoscutum vivid orange, with 2 short, longitudinal, median, ivory lines; exceptionally lateral lobes somewhat infuscated; basic color of rest of thorax pale orange with extensive ivory and restricted black markings; the following ivory: scutellum, post-scutellum, collare, pronotal ridge and base, subalarum, tegulae, declivity of propodeum (except area posteromedia), lower 1/2 of mesopleura extensively, and sometimes metapleura apically; sterna and prepectus ivory-tinged orange; the following black: basal furrow of scutellum, axillary troughs, usually basal furrow of propodeum medially, and narrowly the lateral sutures of mesoscutum; legs uniformly light orange, coxae and trochanters I and II extensively whitish; abdomen uniformly orange; flagellum black, with dorsal white annulus on segments 5 or 6 to 11 or 12, segments before annulus sometimes brownish tinged toward apex and ventrally, scape brownish or orange ventrally.

FLAGELLUM: Very slender and long, bristle shaped, not the least widened beyond middle, with elongate basal segments, strongly

attenuated apically, with 33-35 segments, the 1st nearly 5 times as long as apically wide, the 12th in lateral view approximately square.

MALE: Length 6 mm. Head white, antennal cavity, ocellar and occipital regions, and a narrow stripe along carina genalis black; thorax orange and white with some black markings; orange are: median lobe of mesoscutum more or less extensively to entirely, sometimes exterior belt of lateral lobes, horizontal part of propodeum extensively or predominantly, and a mark on and around speculum; the following black: lateral lobes of mesoscutum predominantly or entirely, propleura medially, basal furrow of scutellum and of propodeum broadly, a mark below subalarum, and axillary troughs, rest of thorax white, including 2 longitudinal, median lines on mesoscutum, prescutellar carinae, scutella, and sometimes 2 short, lateral lines on mesoscutum; legs orange, except the following white: coxae and trochanters I and II, coxae III dorsally and ventrally more or less extensively; 1st trochanters III and the last 2 segments of tarsi III almost always blackish infuscated; abdomen orange, tergites 1 or 2 to 5 or 6 with basal black bands of variable extent, but always most extensive on 2nd tergite; postpetiole usually with more or less distinct, apical yellowish band; rarely abdomen uniformly orange; flagellum black, with not quite complete white annulus on segments 9 or 10 to 13 or 14 or 15, ventrally often brownish; scape ventrally white.

FLAGELLUM: With 31-32 segments, without (at 60 times magnification) recognizable tyloids.

DISTRIBUTION (map 129): LOUISIANA. Evangeline Co.: 2 males, Bayou Chicot, 12-14-IV-1972, G. Heinrich. Natchitoches Co.: 2 males, Powhatan, 11-VI-1971, G. Heinrich. Webster Co.: 6 females, 1 male, Bistineau State Park (near Doyline), 16-30-IV-1971, G. Heinrich, D. Shaneck. MISSISSIPPI. Lafayette Co.: 1 female, Water Valley, 5-10-VIII-1970, M. Horan. TENNESSEE. Henderson Co.: 9 males, Natchez Trail State Park, 18-25-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

1b. *Neolinycus michaelis georgianus* Heinrich
Map 130

FEMALE: Basic color of mesoscutum uniformly deep black, with 2 longitudinal, median, white lines reaching to the anterior border of mesoscutum; all pleura orange,



Map 129. *Neolinycus michaelis michaelis* Heinrich

without white parts, except a white mark on lower, apical corner of mesopleuron; pre-scutellar carinae white; otherwise as *michaelis michaelis*.

DISTRIBUTION (map 130): GEORGIA. Monroe Co.: 1 female, Forsyth, 28-VIII-1971, F. Naumann (CGH II).



Map 130. *Neolinycus michaelis georgianus* Heinrich

**1c. *Neolinycus michaelis*
arkansae, new subspecies**
Map 131

MALE: Basic color of entire mesoscutum black; tarsi II and III entirely black; 1st tergite entirely black, except white, apico-median band; basal black bands on tergites 2-5 covering more than basal 1/2 of segments; white annulus of flagellum restricted to 2-3 segments; prescutellar carinae not white marked; broad middle of frons black, confluent with black on antennal cavity; otherwise as *michaelis michaelis*.

Holotype: male, Arkansas, Garland Co., Ouchita State Park, 9-17-V-1972. Paratype: 1 male, same data. All specimens in CGH II.

DISTRIBUTION (map 131): Known only from the type locality.

41. Genus *Apaeleticus* Wesmael
Apaeleticus Wesmael, 1844:165.

Type species: *Apaeleticus bellicosus* Wesmael; designated by Ashmead, 1900.

A group of small species, well distinguished by the combination of the following characters: (1) spiracles of propodeum small and circular; (2) median field of face strongly protruding and clearly separated by transverse depression from the convex clypeus; (3) sculpture of propodeum extremely coarsely irregularly reticulate rugose, the areae



Map 131. *Neolinycus michaelis arkansae*, n. subsp.

dentiparae usually (as also in the American species) with distinct, toothlike projections; (4) areolet pentagonal; (5) gastrocoeli distinct, moderately impressed, specifically varying in size, their interspace usually somewhat wider than 1 of them; (6) postpetiole and anterior tergites coarsely punctured, the former sometimes medially rugose punctate; (7) in females the 6th and 7th tergite usually hidden under the 5th, giving the abdomen an apically truncate shape.

The American forms differ in 2 characters from the European: the scutellum is laterally strongly carinate, and the speculum on mespleura is impunctate and glossy.

DISTRIBUTION: Holarctic Region.

1. *Apaeleticus americanus* Cushman
Map 132

Apaeleticus americanus Cushman, 1926:4, female. Townes and Townes, 1951:208, female. Heinrich, 1962:792-793, female, male.

Holotype: female, Maryland, USNM. Neallotype: male, Maryland; CHT.

SYSTEMATICS: Heinrich (1962) described *brunnescens*, from Maine, tentatively as a distinct species. I am now inclined to regard this form as the vicariant northern subspecies of *americanus*. The material of the 2 forms at hand, however, is still not sufficient for a well founded conclusion whether they would be associated as subspecies, or better separated as full species.

FEMALE: Length 7.5-8.5 mm. Almost uniformly ferruginous; collare, scutellum, subalarum, and apical margin of 6th and 7th tergites white, usually also pronotal base partially; apices of femora III and of tibiae III black; flagellum tricolored: black, with scape and segments 1-3 or 6 ferruginous and broad, white annulus on segments 6 or 7 to 11 or 12.

FLAGELLUM: Long and very slender, bristle shaped, ventrally flattened beyond middle but not at all widened, all segments considerably longer than wide, extremely attenuated toward apex, with 38-40 segments.

THORAX: Basal 1/3 of notauli, and sternauli on mesosternum pronounced; scutellum rather strongly convex, laterally rather highly carinate for its entire length; speculum large, impunctate, polished; propodeum with rather strong, toothlike projections.

ABDOMEN: Median field of postpetiole irregularly rugose and punctate, the lateral fields coarsely punctate; 2nd tergite somewhat longer than apically wide; gastrocoeli moderately deepened, with distinct thyridia,

their interspace slightly narrower than 1 of them; tergites 2-4 coarsely and moderately densely punctured.

MALE: Length 7.5-8.5 mm.

FLAGELLUM: With 37-39 segments, without tyloids. Black, ventrally brownish, with complete white annulus on segments 8 or 9 to 16, 17, or 18; scape ventrally white.

HEAD: Black; the following white: mandibles except teeth, clypeus and face (in specimen from Tennessee with black lines running on sides of median field of face down to foveae of clypeus), frontal orbits broadly up to vertex, and lower 1/2 of outer orbits, the white color extending below over entire surface of cheeks including malar space.

THORAX: Basic color of pronotum, prosternum, and prepectus black, with the following white markings: collare, pronotal ridge and pronotal base, subalarum, tegulae in part, and apex of prosternum; basic color of mesopleura, mesoscutum, and propodeum ferruginous with the following black parts: narrow sutures around mesoscutum, basal furrow of scutellum and of propodeum, axillary troughs, longitudinal band on upper part of mesopleura, and middle of area posteromedia more or less extensively; mesosternum usually ferruginous with black median band, widened toward the apex; in specimen from Tennessee mesosternum entirely black, except a white mark on its anterior 1/3 between sternauli.

LEGS: Ferruginous; coxae I and II and 1st trochanters I and II predominantly white, the former basally, the latter dorsally black; coxae III uniformly ferruginous; 1st trochanters III predominantly black, the femora and tibiae III broadly black at apex.

ABDOMEN: Uniformly ferruginous.

DISTRIBUTION (map 132): Alberta (Townes and Townes, 1951), Maryland, and Tennessee. **TENNESSEE.** Henderson Co.: 1 male, Natchez Trail State Park, 22-23-VI-1972, G. Heinrich, D. Shaneck (CGH II).

VI. Tribe Trogini (Foerster)

Trogidae Foerster, 1868:143.

Trogina Woldstedt, 1877.

Trogini Ashmead, 1895:278. Hopper, 1939: 307-346. Townes and Townes, 1951:304-306. Townes, et al., 1961:396-399 (partim); (the subtribe Callajoppina Heinrich transferred to tribe Protichneumonini). Heinrich, 1967-1968:230-241.

Type genus: *Trogus* Panzer.

SYSTEMATICS: The Trogini are morpho-



Map 132. *Apaeleticus americanus* Cushman

logically the most highly specialized tribe of the subfamily. This is particularly apparent in the structure of the strongly raised, often pyramidal scutellum and of the abbreviated propodeum with a smooth culminating boss or arch and with 2 declivities slanting down from this culminating point toward the front and rear of the propodeum, a character regarded as decisive for the distinction of the tribe. Another basic character of the entire tribe is found in the irregularly trapezoidal shape of the areolet.

The subtribe Trogina displays in addition a highly specialized structure and sculpture of the tergites.

DISTRIBUTION: Subtribe Callajoppina Heinrich: Holarctic, Oriental, Neotropic, and (with only a few species) also Ethiopian regions. Subtribe Trogina (Foerster): Holarctic, Oriental, and (in particular abundance) Neotropic regions; lacking in Ethiopian region.

VI A. Subtribe Callajoppina Heinrich

Callajoppina Heinrich, 1962:809-810. Heinrich, 1967-1968:233-235.

Type genus: *Callajoppa* Cameron.

SYSTEMATICS: The Callajoppina differ from the following subtribe, the Trogina mainly, and at the 1st glance, by the normal structure and fine sculpture of the tergites. They are, on the average, larger in size,

including the largest forms of the entire subfamily. In general appearance, size, and head structure they resemble the Protichneumonini, and a few seemingly intermediate forms between the 2 groups indeed exist (Heinrich, 1968, Ent. Tidskr. 89:82, genus *Trogichneumon*). However, even in such exceptional cases of doubt, the peculiar, irregularly trapezoidal shape of the areolet of the Callajoppina permits a clear-cut separation from the Protichneumonini (with regularly pentagonal to regularly rhomboidal areolet).

In contrast to the Trogina, the Callajoppina, as far as known, parasitize the Spingidae.

42. Genus *Gnamptopelta* Hopper

Gnamptopelta Hopper, 1939:333. Heinrich, 1962:837-838.

Type species: *Trogus obsidianator* Brullé; original designation.

SYSTEMATICS: The decisive character of this genus, separating it from all others of the Callajoppina, is the structure of the clypeus, which is apically moderately emarginate and has oblique sides, slightly converging toward apical margin. The scutellum is highly raised above the postscutellum and bluntly conical, thus approaching the scutellar structure of *Tmetogaster* Hopper. The complete lack of an elevation on the elbow of the 1st tergite is a 2nd character for distinguishing *Gnamptopelta* from *Tmetogaster* and from *Conocalama* Hopper as well.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, moderately long, ventrally flattened beyond middle and slightly widened, extremely attenuated toward apex; of males long, slightly nodose by unobtrusive, subapical bristle ridges, with a row of rather small, oval tyloids.

HEAD: Temple profile not narrowed behind eyes, strongly curved; frons distinctly concave; temples slightly convex, barely declivous toward carina occipitalis; cheeks in lateral view wide and convex; cheek profile in frontal view scarcely narrowed toward mandible base; malar space about as long as width of mandible base; clypeus as described above; median field of face somewhat protruding, clearly delimited by sharp, lateral, longitudinal impressions continuing downward to clypeal foveae; mandibles broad, the upper tooth not much longer than the lower; finely and densely punctured, the clypeus less densely than the rest, the frons

more densely punctured and finely transversely rugose.

THORAX: Mesoscutum markedly longer than medially wide, convex, densely punctured all over, opaque; anterior third of notauli distinct; scutellum subconical, gradually ascending from basal furrow to a more or less distinctly pointed culminating peak, then steeply declivous toward postscutellum, densely punctured; sternauli obsolete; area superomedia reduced to a narrow, protruding arch, which culminates above the rest of the propodeum and is medially in front produced into a short ridge, forming the base of the declivous area basalis; the upper part of area postmedia forming a narrow bottle-neck, tending to develop a central longitudinal ruga; areae superoexternae densely punctured, rest of propodeum more or less coarsely and irregularly rugose.

LEGS: Fairly long and slender; coxae III densely punctured, without scopa.

WINGS: Nervulus postfurcal; areolet irregularly trapezoidal and distinctly petiolate; radius markedly curved at base, slightly at apex. Very strongly and evenly infuscated.

ABDOMEN: Moderately long, of females amblypygous, very densely punctured and subopaque from base to apex; puncturation on anterior tergites fairly coarse; median field of postpetiole distinct at base, sometimes to middle, always obsolete beyond middle of postpetiole, apical part of postpetiole flat and densely punctured; gastrocoeli fairly deep, with distinct thyridia; their interspace as wide as one of them or slightly narrower, short irregularly striate.

CHROMATIC CHARACTERS: Flagellum in both sexes always pale orange yellow (infuscated toward tip) and wings always uniformly, very deeply infuscated, legs black; head, thorax, and abdomen deep black, color of head, thorax and 1st tergite varying to partially or almost entirely red.

DISTRIBUTION: Eastern North America from Ontario and Quebec south to Louisiana and Florida, west so far recorded to Manitoba, Kansas, and New Mexico.

1a. *Gnamptopelta obsidianator* *obsidianator* (Brullé)

Map 133

Trogus obsidianator Brullé, 1846:299, male (described as female).

Gnamptopelta obsidianator, Hopper, 1939: 334-335. Townes and Townes, 1951:304.

Townes, et al., 1961:113, male (designation of lectotype). Heinrich, 1962:839, female, male. Lectotype: male, Philadelphia; Instituto e Museo di Zoologia, Università di Torino, Coll. Serville.

SYSTEMATICS: In eastern North America 2 morphologically almost identical forms of the genus *Gnamptopelta* occur, 1 entirely black, the other with extensively red head, thorax, and sometimes 1st tergite. As these forms replace each other geographically in the greatest part of their range, they have been considered at 1st by Townes and Townes (1951) and later by Heinrich (1962) as subspecies of 1 and the same species, although by Heinrich with some reservations.

Recent field observations have revealed some additional information related to the hypothesis of the subspecific status of the 2 forms: during 1967 and 1968, G. Heinrich and D. Radtke collected in Lee and Highlands Cos. (Florida) in places overgrown with *Vitis*, an estimated number of more than 100 specimens of *Gnamptopelta*. All these specimens were examined with regard to color, although only about 1/2 of them were kept and preserved. Almost all belonged to the form *austrina* (Cresson), with red head and mesoscutum, with the exception of only 2 specimens (less than 2%) of the entirely black form *obsidianator* (Brullé).

Near Tallahassee (Tall Timbers Research Station), in exactly the same type of habitat, a place overgrown by *Vitis*, a population of *Gnamptopelta* was observed of which 7 specimens were collected, all belonging to the black form *obsidianator* also found in Liberty Co. (Torreya State Park); however, a single specimen of *austrina* was collected only about a mile away from the *obsidianator* population, and *austrina* has been recorded before sporadically from Georgia and South Carolina where otherwise the *obsidianator* population occurs.

Summing up, it can be stated that *austrina*, the form with red head and mesoscutum, occupies the peninsula of Florida except its most northern part, and that the uniformly black *obsidianator* occupies the entire eastern territory of continental North America, including the base of Florida. Very sporadically, however, *obsidianator* also occurs in the territory of *austrina*, and likewise, sporadically, *austrina* is found in the southern parts of the territory of *obsidianator*. It has to be noted that both forms (at least in Florida and Georgia) are found in the same habitat, that is, places

overgrown by *Vitis*, and it also must be mentioned that "intergrades" between the 2 forms have never been found.

The lack of intergrades hints at the possibility that the 2 forms do not interbreed, which would prove their specific status. On the other hand their common habitat suggests subspecific association. However, as more than 1 species of Sphingidae feeds on *Vitis*, there is theoretically still the possibility that *austrina* and *obsidianator* are ecologically differentiated species parasitizing 2 different hosts living on the same plant. Discovery of the host relation of the 2 forms of *Gnamptopelta* doubtlessly will be the key to the final clearing of their specific or subspecific status. For the time being I see no conclusive reason yet to abandon the subspecific hypothesis.

FEMALE: (description based on populations from Florida). Length 21-26 mm. Almost entirely coal black, including head and thorax; frontal orbits narrowly reddish yellow, at least at level with antennal sockets, sometimes up to level with lower ocellus; outer orbits and mandibles medially broadly ferruginous; femora I toward apex, the tibiae I, and sometimes metatarsus I fulvous; wings uniformly very strongly infuscated; flagellum pale yellow, slightly orange tinged beyond middle, infuscated at tip; scape ferruginous.

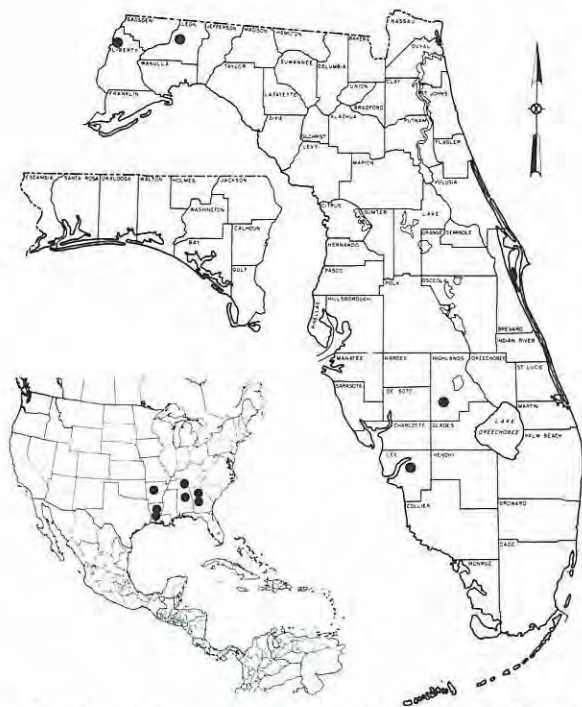
FLAGELLUM: With 46-47 segments, the 1st fully twice as long as apically wide, in lateral view about the 6th approximately square, seen on the flat side the widest 2.5 times as wide as long, the apical section very strongly attenuated and thin.

MALE: Length 25-27 mm. Almost entirely coal black, including head and thorax; upper facial orbits narrowly yellow; outer orbits and mandibles medially broadly ferruginous; femora I toward apex, the tibiae I, and metatarsus I ventrally or entirely fulvous; wings uniformly very strongly infuscated; flagellum pale yellow, slightly orange tinged beyond middle, infuscated at tip.

FLAGELLUM: With 46-47 segments and with small tyloids on segments 5 or 6 to 22 or 23, the 1st tyloids punctiform, minute, those following short oval and covering about the median 1/3 of the length of segments; the last tyloids punctiform again.

VARIATION: Face and clypeus sometimes broadly ferruginous red in the middle.

DISTRIBUTION (map 133): Manitoba, Ontario, and Quebec south to northern



Map 133. *Gnamptopelta obsidianator obsidianator* (Brullé)

Florida, west to Ohio, Kansas, and New Mexico. ALABAMA. Garland Co.: 1 male, Ouachita State Park, 27-V-1972, G. Heinrich. FLORIDA. Highlands Co.: 1 male, Archbold Biological Station, 10-VI-1970, G. Heinrich. Lee Co.: 1 male, Ft. Myers, 28-VII-1967, D. Radtke. Leon Co.: 4 females, 3 males, Tall Timbers Research Station, 1-17-V-1968, G. Heinrich. Liberty Co.: 1 female, Torreya State Park, 11-V-1968, G. Heinrich. GEORGIA. Banks Co.: 1 male, Homer, 12-V-1970, G. Heinrich. Clarke Co.: 1 female, Athens, 7-21-IX-1970, H. Herman. Monroe Co.: 4 females, Forsyth, 5-15-VI-1968, 1970, G. Heinrich, F. Naumann. LOUISIANA. Evangeline Co.: 1 female, Bayou Chicot, 28-V-1971, G. Heinrich. Webster Co.: 1 male, Bistineau State Park, 3-V-1972, D. Shaneck. TENNESSEE. Henderson Co.: 1 female, Natchez Trail State Park, 21-VI-1972, G. Heinrich. All specimens in CGH II.

ECOLOGY: In Florida and Georgia common everywhere in places covered by a dense carpet of wild grape (*Vitis*). Here, males fly around, usually low, above and between the vines of the wild grape, particularly during the forenoon hours; females often are hidden underneath the carpet of grape vines, apparently in search of host larvae.

HOSTS: Although this is the most conspicuous, the largest, and the most common of the Ichneumoninae of Florida, no host

record is available yet. As the Callajoppina normally are parasites of Sphingidae and as *Gnamptopelta obsidianator* is clearly ecologically connected with stands of wild grape, it could be assumed that a hawk moth feeding on *Vitis* is, at least in Florida, the host of this species.

Hopper (1939:345) quoted from a New York check list *Papilio polyxenes asterius* Stoll as host. I consider this record as very dubious and unacceptable unless confirmed by new rearing.

1b. *Gnamptopelta obsidianator* *austrina* (Cresson) Plate 7, Map 134

Trogus austrinus Cresson, 1868:92.

Gnamptopelta austrina, Hopper, 1939:355.

Gnamptopelta obsidianator austrina, Townes and Townes, 1951:304. Heinrich, 1962: 839-840, female, male.

Holotype: female, Capron, Florida; ANS (note: Capron was a fort, abandoned 1858, located north of Ft. Pierce, St. Lucie Co.).

FEMALE: Length 21-25 mm. Coal black, except predominantly or entirely red head and mesoscutum (including or excluding scutellum) and partially red pronotum; femora, tibiae, and tarsi I entirely fulvous, femora and tibiae III extensively fulvous; usually also prosternum, mesosternum, prepectus, and subalarum extensively to entirely red; wings evenly and very strongly infuscated; flagellum yellow, faintly orange tinged, with infuscated tip; scape ferruginous.

FLAGELLUM: With 47-49 segments, the 1st nearly 2.5 times as long as apically wide, in lateral view the 8th approximately square, seen on the flat side the widest 2 times as wide as long, the apical section very strongly attenuated and thin.

MALE: Length 21-26 mm. As female, facial orbits usually yellow or yellow tinged.

DISTRIBUTION (map 134): Florida as follows: (the following are records from Hopper (1938): Alachua Co.: Gainesville. Collier Co.: Indian River, Royal Palm State Park (ANS). DeSoto Co.: Arcadia. St. Lucie Co.: Capron (ANS; holotype). Orange Co.: Enterprise (Ohio State College), Maitland. Pinellas Co.: Big Bayou (USNM), St. Petersburg. Polk Co.: Ft. Meade (Univ. Kansas). Unpublished records: Clay Co.: 1 female, Gold Head Branch State Park, 19-IV-1971, G. Heinrich. Highlands Co.: 3 females, 4 males, Archbold Biological Station, VI-1967, G. Heinrich. 1 female, Highlands Hammock



Map 134. *Gnampotopelta obsidianator austrina* (Cresson)

State Park, 24-IV-1968, G. Heinrich. Lee Co.: 14 females, 25 males, Ft. Myers, 30-III-28-VIII-1967-1969 (all months inclusive), G. Heinrich, D. Radtke. Leon Co.: 1 female, Tall Timbers Research Station, 7-17-V-1968, G. Heinrich. All specimens in CGH II.

ECOLOGY: Frequents places overgrown by wild grape (*Vitis*).

BIOLOGY: Appears at the end of March and occurs all summer long into September, with the peak of frequency from May to July.

HOSTS: Unknown, but probably Sphingidae feeding on *Vitis*.

43. Genus *Conocalama* Hopper

Conocalama Hopper, 1939:319. Townes and Townes, 1951:305-306 (7 species, 2 subspecies, and 2 variations from Nearctic Zone). Heinrich, 1962:815-836 (12 species and 2 subspecies from Nearctic Zone). Townes and Townes, 1966:287 (1 species from Mexico).

Type species: *Trogus brullei* Cresson. Original description.

SYSTEMATICS: This genus is very closely related to *Callajoppa* Cameron. It is distinguished from *Callajoppa* by a more or less pronounced (exceptionally obsolete) subpyramidal elevation on the elbow of the 1st tergite, and it differs slightly in the structure of the scutellum, which is considerably raised above the postscutellum and dorsally convex (never conically elevated to a point), with

gradually rounded apical slope. *Conocalama* is also rather closely related to *Gnampotopelta* Hopper, differing from the latter genus also by the elevation on the elbow of the 1st tergite and by quite straight apical margin of clypeus.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females bristle shaped, long, ventrally flattened beyond middle but usually not tangibly widened, extremely attenuated toward apex; of males slightly nodose, with distinct, subapical bristle ridges and with a row of very small, short-oval tyloids.

HEAD: Frons strongly concave; temples broad, curved; median field of face clearly defined and separated from the lateral fields and the clypeus; clypeus with straight apical border and, as a rule, with a small, median projection or protuberance.

THORAX: Mesoscutum longer than wide, convex, densely sculptured and subopaque; anterior 1/3 of notauli distinct; scutellum considerably raised above postscutellum, with steep apical slope, dorsally convex, but never conically elevated into a point; sculpture of areae dentiparae varying specifically from moderately coarsely rugose punctate to rather coarsely reticulate rugose.

WINGS: Areolet distinctly petiolate, irregularly quadrangular, the 2nd intercubitus being longer than the 1st.

ABDOMEN: Of females amblypygous, longish oval; postpetiole at the elbow with a distinct, subpyramidal elevation, which is sometimes on the top medially depressed, and which can be obsolete in rare cases; gastrocoeli distinctly deepened, each narrower than their interspace, with fairly distinct thyridia; tergites 1-4 or 5 finely and very densely punctured, subopaque.

DISTRIBUTION: Nearctic Zone and Mexico.

HOSTS: Sphingidae.

1. *Conocalama brullei* (Cresson)

Map 135

Trogus brullei Cresson, 1877:196, female, male.

Conocalama brullei, Hopper, 1939:322-323, female, male. Townes and Townes, 1951:305, female, male. Heinrich, 1962:818-819, female, male.

Holotype: female, Connecticut; ANS.

SYSTEMATICS: By the deep black color of almost the entire body, the deeply and evenly infuscated wings, and the orange-yellow

flagellum extremely similar in appearance to *Gnamptopelta obsidianator obsidianator* (Brulle), but recognizable at once by the distinct, conical elevator on the elbow of the 1st tergite.

FEMALE: Length 20-28 mm. Almost uniformly black; sometimes middle of inner orbits with a yellowish or obscure-ferruginous mark; legs black, tibiae I pale ferruginous on anterior side; wings uniformly and deeply infuscated; flagellum light orange yellow, infuscated apically; scape black.

FLAGELLUM: Long, apically very long and strongly attenuated, with 53-55 segments, the 1st about 2.5 times as long as apically wide, in lateral view the 8th square, the widest on the flat side nearly 1.5 times as wide as long.

MALE: Generally as the female; almost uniformly black; sometimes partially dull ferruginous to yellowish are: mandibles, clypeus, upper facial and lower frontal orbits, lower outer orbits; tibiae I, sometimes also tarsi I and tibiae II, pale ferruginous, at least on anterior side; flagellum sometimes entirely orange yellow or apically more of less extensively infuscated; scape orange yellow to black.

FLAGELLUM: With very small, short-oval tyloids on segments 5-22.

DISTRIBUTION (map 135): Ontario and Maine south to Georgia and Mississippi, west



Map 135. *Conocalama brullei* (Cresson)

to New York, Pennsylvania, and Colorado. GEORGIA. (State record given by Hopper, 1939). MISSISSIPPI. Jackson Co.: 2 females, Lucedale, 14-19-VI-1970, G. Heinrich (CGH II).

HOSTS: *Paonias astylus* (Dru.), *Paonias myops* (J.E. Smith), *Dolba hylaeus* (Dru.), and *Manduca sexta* (L.).

44. Genus *Tricyphus* Kriechbaumer

Tricyphus Kriechbaumer, 1898:4, 30. Hopper, 1939:335-339. Townes and Townes, 1951: 304-305 (3 Nearctic species). Heinrich, 1962:840-843. Townes and Townes, 1966: 286-287 (3 species from Brazil).

Type species: *Tricyphus cuspidiger* Kriechbaumer; designated by Viereck, 1914.

SYSTEMATICS: The peculiar and unique shape of the areolet represents the decisive character within the subtribe; the 1st intercubitus is more abbreviated than in *Gnamptopelta* Hopper, the 2nd abscissa of the cubitus is extremely short, these 2 peculiarities giving the (petiolate) areolet an almost triangular outline.

Four chromatically quite different forms of this genus occur in North America. Townes (in correspondence) suspects that they may represent different color phases of 1 and the same species, because structural differences between them are not found. This hypothesis may be correct, but, on the other hand, in entomology as well as in ornithology enough cases are known where specific distinctions have been proven by biological facts or distributional pattern, although structural differences (visible to the human eye) did not exist. In the case of the genus *Tricyphus*, the question whether some of the forms so strikingly different in color but apparently identical in morphology represent mere color phases or full species, cannot be answered decisively without additional biological data. Until proof can be obtained, it seems advisable to maintain the taxonomic status quo.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females long, bristle shaped, ventrally flattened beyond middle and distinctly widened, extremely thin and attenuated toward apex; of males with a very long row of distinct, narrow tyloids, the segments from base to about middle of flagellum overlapping each other apically on exterior side considerably.

HEAD: Temple profile only slightly narrowed behind eyes, strongly curved; frons distinctly concave; temples not abruptly, though moderately steeply declivous toward

carina occipitalis; cheek profile somewhat narrowed toward mandible base, almost straight; malar space nearly as long as width of mandible base in females, shorter in males; median field of face distinctly protruding, with distinct lateral longitudinal impressions, extending to clypeal foveae, but without apical transverse impression separating it from the clypeus; mandibles normal, fairly broad at base, gradually tapering toward apex, the upper tooth somewhat, but not much, longer than the lower tooth.

THORAX: Mesoscutum fairly convex, distinctly longer than medially wide, rather densely punctured, somewhat shiny; notauli faintly indicated at base only; lateral lobes with indistinct, fairly wide longitudinal depressions; sternauli lacking; scutellum strongly raised, steeply ascending from basal furrow to a culminating point and vertically declivous apically ("pyramidal") or culminating in a narrow ridge instead of a point; propodeum culminating in a smooth or nearly smooth boss, abruptly and very steeply declivous behind it, not quite as steeply declivous in front of the boss and of the costulae into the basal furrow, the bottom of which is crenulate; propodeum very coarsely and irregularly reticulate rugose, only the anterior declivity in front of the costulae not rugose but densely punctured, areae metapleurales also punctured; mesopleura punctured, with smooth speculum and a deep fovea below the speculum, in front of this fovea a large and wide, smooth and shiny depression; mesosternum flat, forming a sharp edge with mesopleura.

LEGS: Moderately long; coxae II and III fairly densely punctured, shiny and almost smooth between punctures.

WINGS: Nervulus distinctly to strongly postfurcal; areolet distinctly petiolate, approaching a triangular shape, the exterior intercubitus being much longer than the interior and the 2nd abscissa of cubitus being extremely short; radius bisinuate. With deeply-infuscated bands or entirely deeply infuscated.

ABDOMEN: Of females amblypygous; postpetiole scarcely convex, densely punctured, with faintly indicated median field; gastrocoeli relatively small, transverse, not deeply impressed, narrower than their interspace, with distinct thyridia; tergites 2 and 3 very densely punctured, subopaque; the following tergites gradually more and more finely punctured; hypopygium of males apically broadly rounded.

CHROMATIC CHARACTERS: Head, thorax, and abdomen black and ferruginous red (or orange ferruginous) in combination or entirely black or ferruginous orange; legs entirely black or orange ferruginous, or both colors in combination, the tarsi III in 2 forms whitish; no white marks except often on facial and frontal orbits; wings always partially or entirely deeply infuscated.

DISTRIBUTION: Neotropical Region (so far recorded from Brazil only) and North America from Florida north to Maine and Michigan, west to Kansas; Porter reported (by personal information) "at least 3 species from northern Argentina."

HOSTS: Sphingidae.

Key to species of *Tricyphus* Kriechbaumer of North America

Females and Males

1. Thorax coal black, without red or ferruginous parts; tarsi III blackish (the ivory basic color of metatarsus hidden by dense blackish pilosity). 2
- Thorax, or at least most of the mesoscutum, ferruginous red or orange ferruginous; tarsi III always clearly ivory white. 3
2. Only anterior tergites, in males at least the 1st, black, the following tergites ferruginous red. (Length 17-21 mm). 1. *apicalis* (Cresson)
- Abdomen wholly black. (Length 20 mm). 2. *ater* Hopper
3. Femora III and apex of tibiae III black; abdomen black, usually except more or less extensively red postpetiole; at least mesoscutum, usually also pleura more or less extensively dark ferruginous red. (Length 19-21 mm). 4. *floridanus* Heinrich
- Femora and tibiae III, usually entire abdomen (except in rare variations the infuscated discs of some posterior tergites), and the entire thorax light orange ferruginous. (Length 17-21 mm). 3. *elegans* (Cresson)

1. *Tricyphus apicalis* (Cresson) Map 136

Trogus apicalis Cresson, 1877:197, female.

Tricyphus apicalis, Hopper, 1939:338. Townes and Townes, 1951:304, female. Heinrich, 1962:842-843, female, male.

Holotype: female, Georgia; ANS.

SYSTEMATICS: I am thoroughly convinced that this is a distinct species, distinguished from *elegans* (Cresson) and from *floridanus* Heinrich in color; this is particularly evident in (1) the abdomen of females which is always basally black (usually tergites 1 and 2), chestnut red apically, in contrast to *floridanus* with apically black abdomen, tending to have the 1st tergite red; (2) the wings of *apicalis* are always deeply and evenly infuscated, showing no tendency to develop clear parts or bands as are usually found in *elegans* and *floridanus*; (3) the tarsi III appear to be black in both sexes in *apicalis*, although segments 1 and 2 are, under close examination, dull whitish tinged, the true color being covered by blackish pilosity, while in *elegans* and *floridanus* the tarsi III are always clearly and entirely ivory white, covered by light pilosity. See also systematics to *ater* Hopper.

FEMALE: Length 17-20 mm. Coal black, including legs, flagellum and scape; in southeastern specimens tergites 3-7 (according to Hopper, 1939, sometimes only 4-7) chestnut red; basal 1 or 2 segments of all tarsi ivory tinged; facial and lower 1/2 of frontal orbits whitish yellow, usually also apical margin of cheeks and lateral corners of clypeus yellow tinged and the sutures around mesopleura yellowish or brownish; tibiae I stramineous tinged, particularly on anterior side; all metatarsi appear black, but are in fact (except bases) stramineous tinged, their light color being covered by dense, black pilosity; the same applies, though less distinctly, to the 2nd segments of tarsi; wings uniformly and very strongly infuscated, without clear bands or parts.

FLAGELLUM: With 43-44 segments, the 1st fully 4 times as long as apically wide, in lateral view the 12th approximately square, seen on the flat side the widest close to 2.5 times as wide as long, the apical 7 segments considerably longer than wide.

THORAX: Scutellum not quite pyramidal but culminating in a narrow, blunted ridge or with a bluntly rounded summit.

WINGS: Heinrich (1962) described 2 specimens from Michigan with a clear band or mark on wings; in all southeastern specimens the wings are uniformly violaceous black.

MALE: Length 20-21 mm. Color as in female, except that the extent of black on the base of abdomen is in Florida specimens usually more restricted than in females, covering only the 1st tergite (in 1 specimen

not even including the apical part of the postpetiole) or, at the most, also the base of the 2nd; ivory color on facial orbits usually covering the entire lateral fields of face and extending onto the sides of clypeus; lower part of outer orbits often also ivory; stramineous tinge on legs tending to be more extensive than in female, covering in addition to basal segments of tarsi and of outer side of tibiae I in 2 specimens most of tibiae II and in 1 of them also base of tibiae III; as in female, the stramineous tinge on legs obscured by black pilosity.

FLAGELLUM: With 39-40 segments and with narrow, elongate, bacilliform tyloids on segments 3 or 4 to 24 or 27. Black, scape sometimes ventrally brown.

HEAD, THORAX, LEGS, WINGS, AND ABDOMEN: As in female, except shorter malar space, pyramidal scutellum, and more slender, elongate abdomen.

DISTRIBUTION (map 136): From Vermont, Michigan, and Illinois south to Florida and Louisiana, west to Ohio and Oregon. FLORIDA. Clay Co.: 1 male, Gold Head Branch State Park, 3-V-1971, G. Heinrich. Highlands Co.: 1 female, 4 males, Highlands Hammock State Park, 1 male, 7-IV-1955 (FSCA), the remainder 28-IV-31-VIII-1969, G. Heinrich, D. Radtke. Lee Co.: 3 females, 2 males, Ft. Myers, 11-IV-26-IX-1967-1971, G. Heinrich, D. Radtke. Liberty Co.: 2 females, 1 male, Torreya State Park, 16-IV-11-V, G.



Map 136. *Tricyphus apicalis* (Cresson)

Heinrich (FSCA, CGH II). LOUISIANA. Evangeline Co.: 1 male, Chicot State Park, 28-VI-5-VII-1971, G. Heinrich. MISSISSIPPI. Lafayette Co.: 2 males, Water Valley, 5-VIII-5-IX-1970, M. Horan. Oktibbeha Co.: 1 female, Starkville, 15-VI-1970, C. Sartor. TENNESSEE. Henderson Co.: 3 females, 3 males, Natchez Trail State Park, 3-23-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II unless otherwise noted.

HOSTS: *Sphinx kalmiae* J.E. Smith (Hopper, 1939:345).

2. *Tricyphus ater* Hopper Map 137

Tricyphus ater Hopper, 1939:339, male. Townes and Townes, 1951:305, male. Heinrich, 1962:843, male.

Holotype: male, Illinois; Collection of Illinois State Natural History Survey, Urbana, Illinois.

SYSTEMATICS: In the original description of this species Hopper referred to its very close relationship to *apicalis* (Cresson) "from which it differs only in wholly black abdomen." In my treatment of *ater* (1962) I expressed and discussed some doubt about the validity of this species. As the 3 specimens recorded below represent all individuals of this form collected during the 30 years since its description, my doubts have now increased rather than decreased. I strongly suspect that this is a very rare, holomelanistic mutant of *apicalis*, with which it shares the dark color and black pilosity of tarsi III, contrasting with *elegans* (Cresson) and with *floridanus* Heinrich as well; but this still remains a hypothesis only, as unproven as the specific status of *ater*. As one hypothesis is as good as the other, I am maintaining here the status quo, recommending this problematic species for further attention and research.

MALE: Length 20 mm. Black, including entire thorax and entire abdomen; the following stramineous yellowish: lateral fields of face, sides of clypeus, lower parts of frontal orbits and sometimes also of outer orbits, labrum, tibiae and tarsi I predominantly, sometimes also II partially, tips of femora I and II, and the 2nd sternite (except laterally); wings strongly and evenly infuscated; flagellum without annulus, black, ventrally brownish (in Tennessee specimens).

FLAGELLUM: With 37 (Florida specimens, 1970) to 41 (Tennessee specimens) segments and with bacilliform, short tyloids on segments 5-25 or 26.

VARIATION: In the specimen from Tennessee the yellowish color of the head is more extensive than in the specimen from Florida: the median fields of face and of clypeus are not black, but only partially blackish infuscated, and lower section of exterior orbits is extensively yellowish.

DISTRIBUTION (map 137): Illinois and the following states: FLORIDA. Dade Co.: 1 male, ("Paradise Key") = Royal Palm Hammock, 12-IV-1951, H. + M. Townes. Highlands Co.: 1 male, Highlands Hammock State Park, 1-8-IV-1970, R. W. Miller. TENNESSEE. Henderson Co.: 1 male, Natchez Trail State Park, 19-24-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II.

3. *Tricyphus elegans* (Cresson) Plate 8, Map 138

Trogus elegans Cresson, 1868:94, female.

Tricyphus vulpinus Szépligeti, 1900:288, female.

Tricyphus elegans elegans, Hopper, 1939:338. Townes and Townes, 1951:305, female. Heinrich, 1962:841, female, male.

Tricyphus elegans vulpinus, Hopper, 1939:338. Townes and Townes, 1951:305, female. Heinrich, 1962:841-842, female.

Holotypes: female, *Trogus elegans*, Maine; ANS. female, *Tricyphus vulpinus*, "Jean-



Map 137. *Tricyphus ater* Hopper

ette"; Magyar Nemzeti Museum, Budapest, Hungary.

SYSTEMATICS: Two subspecies of this species, *e. elegans* and *e. vulpinus*, have been acknowledged so far by Hopper, Townes, and Heinrich. The only subspecific distinction between them was the difference in the extent of infuscation of the wings, which were assumed to be predominantly clear (with infuscated apical and basal bands) in *e. elegans* and uniformly infuscated in *e. vulpinus*, the former subspecies supposedly inhabiting the northeastern part of the range of the species, the latter the entire rest. It has now become evident that the extent of infuscation of the wings is individually highly variable in this species throughout its entire range from north to south. Specimens with predominantly clear wings and specimens with uniformly infuscated wings already have been recorded from Ontario, Massachusetts, New York, and Illinois. I have now 4 specimens at hand (collected in Florida in 1968) which display a perfect graduated series from the predominantly clear wings of *e. elegans* to the uniformly infuscated wings of *e. vulpinus*. It seems that under these circumstances the division of *elegans* into 2 geographical subspecies is not tenable, although apparently toward the northern part of the range of the species the percentage of clear-winged individuals gradually increases.

I have no doubt whatsoever that *elegans* is a full species, different from *apicalis* (see also systematics to that species); both species are sympatric but apparently adapted to different hosts.

The species is chromatically distinguished by usually uniformly light, orange-ferruginous color of the entire body. Infuscations of a few tergites occur occasionally but only on the dorsal surface of the posterior part of the abdomen; the tarsi are always yellowish white.

FEMALE: Length 19 mm. Light orange ferruginous, including legs; tarsi III and basal segments of tarsi I and II yellow-tinged white, as are usually also tibiae I and II partially (less intensively); yellowish are: sides of clypeus, facial and lower frontal orbits more or less extensively; scape and basal about 6 segments of flagellum obscure ferruginous, the following segments gradually shading from brownish into blackish; wings deeply infuscated in individually varying extent, from predominantly clear with infuscated apices and median bands to uniformly infuscated.

FLAGELLUM: With 44-46 segments, the 1st segment about 3 times as long as apically wide, in lateral view the 9th or 10th square, the widest on the flat side fully twice as wide as long.

THORAX: Scutellum not quite pyramidal but culminating in a narrow, transverse, blunted ridge.

MALE: Length 21 mm. Color and wing infuscations as in female; flagellum dorsally blackish, ventrally brown in Florida specimens, pale orange tinged yellow in a specimen from Tennessee.

FLAGELLUM: In Florida specimens with 41-42 segments and with tyloids on segments 4-27 or 29, the 1st minute and punctiform, the following tyloids bacilliform.

HEAD AND THORAX: Malar space somewhat shorter than in female; scutellum tending to be more distinctly pyramidal than in female, though the culminating point usually is blunted.

DISTRIBUTION (map 138): Prince Edward Island, Quebec, Ontario, and Illinois, south to southern Florida, west to Kansas. **FLORIDA.** Dade Co.: 2 males, Royal Palm Hammock, 6-8-IV-1951, C. H. and M. Townes. Highlands Co.: Archbold Biological Station, 1 female, 9-VIII-1969, 1 male, 21-IV-1968, G. Heinrich. Highlands Hammock State Park, 1 female, 1 male, 13-28-IV-1968-1970, 1 female,



Map 138. *Tricyphus elegans* (Cresson)

28-VIII-1969, G. Heinrich, D. Radtke. Lee Co.: 1 male, 14-IV-1968, Ft. Myers, G. Heinrich. Putnam Co.: 1 male, Red Water Lake, 15-IV-1961 (FSCA). LOUISIANA. Natchitoches Co.: 1 female, Natchitoches, College Forest, 16-IV-1971, G. Heinrich. TENNESSEE. Henderson Co.: 2 females, 1 male, Natchez Trail State Park, 1-15-VI-1972, G. Heinrich, D. Shaneck. All specimens in CGH II unless noted otherwise.

HOSTS: *Ampeloeca myron* (Cramer) (Hopper, 1939).

4. *Tricyphus floridanus* Heinrich Plate 9, Map 139

Tricyphus elegans floridanus Heinrich, 1962:842, male.

Holotype: male, Orlando, Florida; CHT (original designation). **Neallotype:** female, Highlands Hammock State Park, Highlands Co., Florida, 24-IV-1968; CGH II.

SYSTEMATICS: When I described this form tentatively as a subspecies of *elegans* (Cresson), only 2 specimens, both males, were at hand. Now 10 more specimens, 5 of them females, have been found in Florida, and also 8 typical, sympatric specimens of *elegans*. This proves beyond doubt that my original hypothesis was wrong and that *floridanus* is not a subspecies of *elegans*. Consequently the 2 forms can only represent either 2 distinct species, or 2 chromatically oddly different phases of the same species. They occur side by side and they share the yellowish-white color of tarsi as well as the individually highly variable type of infuscation of wings; otherwise they are chromatically strikingly and constantly different, and linking intergrades have not been collected. This seems to suggest specific distinction. An additional confirmation of this hypothesis is offered by the distributional pattern of the 2 forms: *elegans* inhabits all of eastern North America, *floridanus* shares with it only the most southern part of its range. This makes the assumption of 2 color phases unlikely, though not quite impossible. Here again the final proof can be achieved only by the biological approach. Until proven otherwise, I consider *floridanus* a distinct species.

FEMALE: Length 19-20 mm. Basic color of head ferruginous red, facial orbits and labrum, sometimes also sides of clypeus and lower part of frontal orbits yellow tinged; at least entire pronotum, the mesoscutum, tegulae, scutellum, and upper part of mesopleura ferruginous red (close to blood red), usually also dorsal surface and declivity of propodeum so colored, exceptionally entire

thorax including entire propodeum ferruginous red; rarely mesoscutum partially infuscated and the entire propodeum black; abdomen always black, only the 1st tergite almost always apically or entirely red; legs including coxae predominantly black, all tarsi as a rule yellowish white; femora I and tibiae I and II light orange ferruginous, rarely also femora II so colored; basal 1/3 to 1/2 of tibiae III sometimes stramineous, exceptionally coxae I and II and base of coxae III ferruginous; wings deeply infuscated, either uniformly or except median mark or transverse band; flagellum in contrast to *elegans* uniformly black, the scape ferruginous ventrally and on anterior side.

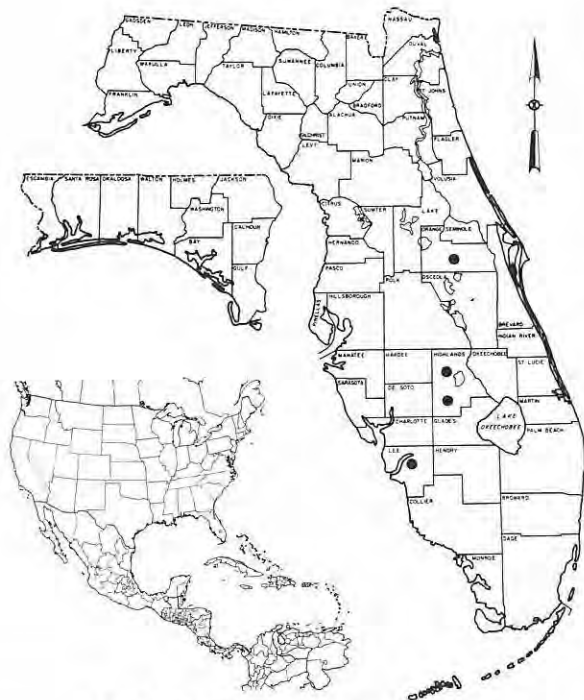
FLAGELLUM: With 42-44 segments; proportions of segments as described for *elegans*.

THORAX: Scutellum blunted pyramidal, not culminating in a narrow, transverse ridge nor in a pointed peak.

MALE: Length 20-21 mm. As in female always basic color of head and at least upper part of mesopleura, the mesoscutum, and the scutellum dark ferruginous red; extent of red on thorax varying individually; usually areae dentiparae red; rarely the entire propodeum, the entire mesopleura, and the entire mesosternum so colored; sometimes propodeum uniformly black; abdomen always black, in most specimens with dark red postpetiole, the last tergite usually brownish; legs including coxae predominantly black, the coxae II and III sometimes dorsally ferruginous; all tarsi yellowish white, all tibiae stramineous yellow except black apical 1/3 or 2/3 of tibiae III; femora I and II usually ferruginous orange; flagellum always black, the scape predominantly ferruginous to predominantly black; yellow on sides of clypeus and on inner orbits usually more extensive than in female, rarely face and clypeus predominantly yellowish; wings deeply infuscated, either uniformly or except translucent median marks.

FLAGELLUM: With 39-41 segments, and with bacilliform tyloids on segments 4 or 5 to 27 or 28.

DISTRIBUTION (map 139): FLORIDA: Highlands Co.: 3 males, Archbold Biological Station, 18-22-IV-1968, G. Heinrich. Highlands Hammock State Park, 3 females, 24-28-IV-1968, 1 female, 1 male, 1-9-IX-1969, G. Heinrich, R. Miller, D. Radtke. Lee Co.: Ft. Myers, 1 female, 20-X-1968, 1 male, 20-IV-1968, G. Heinrich, D. Radtke. Orange Co.: 1



Map 139. *Tricypthus floridanus* Heinrich

male, Orlando, III-1944, R. and G. Bohart. All specimens in CGH II.

VI. B. Subtribe Trogina (Foerster)

Trogoidae Foerster, 1868:143.

Trogina Woldstedt, 1877; Heinrich, 1962:844. Heinrich, 1967:230 (mentioned as not recorded from Africa).

Type genus: *Trogus* Panzer.

SYSTEMATICS: The genera of this subtribe are distinguished from the Callajoppina by extraordinarily strong sclerotization and extremely coarse sculpture of the tergites (except the apical 1, 2, or 3), which show the tendency to mould their surface into plastic features such as convexities, ridges, and lateral slopes. The structure of the propodeum and of the areolet in the forewing agrees roughly with the former subtribe.

Only 1 genus and 1 species is recorded from Florida.

HOSTS: Papilionidae, Nymphalidae.

45. Genus *Trogus* Panzer Fig. 67-71

Trogus Panzer, 1806:80. Hopper, 1939:314-315 (4 Nearctic species). Townes and Townes,

1951:306 (4 Nearctic species). Heinrich, 1962:846 (5 Nearctic species, including the Holarctic *lapidator coeruleator* Fabricius). Townes, et al., 1961: 397-398 (2 Indo-Australian species). Townes, et al, 1965:516-519 (2 species, 3 subspecies of *lapidator* Fabricius listed from eastern Palearctic Zone). Townes and Townes, 1966:275 (2 species, from Cuba and Brazil).

Type species: *Ichneumon coeruleator* Fabricius; monobasic.

Dinotomus Foerster, 1868:188.

Type species: *Ichneumon coeruleator* Fabricius; designated by Viereck, 1914.

SYSTEMATICS: This is the only genus of the subtribe recorded from Florida and the neighboring states. It is at once recognizable by the extraordinary structure and sculpture of anterior tergites as described for the subtribe. The taxonomic status of the 4 forms listed for the United States by Hopper (1939), Townes and Townes (1951), and Heinrich (1962) is not yet totally clarified. There is a hypothesis that they all should be considered as associated subspecies. This theory cannot be correct, as at least in Maine a wholly ferruginous form occurs side by side with the black *fulvipes* Cresson, the 2 forms showing ecological differences and thus obviously representing 2 full species. The wholly ferruginous species, so far known under the name *pennator* Fabricius, is widely distributed over North America, shows well established geographical differences, and should be subdivided into several subspecies. Whether the partially black forms, *flavipennis* Cresson and *edwardsii* Cresson, are to be considered also as subspecies of *pennator*, or whether they are subspecies of *fulvipes*, will be hard to prove. Therefore their present status as full species is best maintained until the contrary can be proven 1 way or another. In Florida so far only forms of the totally ferruginous *pennator* complex have been found.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females (fig. 67) slender, moderately long; bristle shaped, ventrally not distinctly flattened and not widened beyond middle, the basal segments not cylindrical and straight cut at intersections but overlapping each other considerably. Of

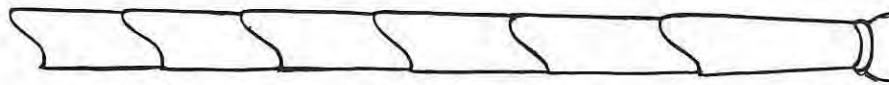


Fig. 67. *Trogus pennator* (Fabricius) (female). Flagellar segments 1-6.

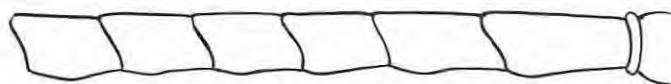


Fig. 68. *Trogus pennator* (Fabricius) (male). Flagellar segments 1-6.

males (fig. 68) without tyloids, nodose, and with distinct, transverse, median bristle ridges on interior side.

HEAD: Temple profile, in vertical view, moderately narrowed behind eyes, slightly curved; cheek profile, in front view, strongly narrowed toward mandible base, straight; frons strongly concave, with 2 median, longitudinal ridges, which, on their upper end are usually raised into more or less prominent, pointed horns (fig. 69); sides of vertex and the temples slightly concave, vertex behind ocelli somewhat convex, eyes bulging; malar space nearly as long as width of mandible base; mandible short, slightly narrowed from base toward apex, the upper tooth not much longer than the lower; median field of face distinctly raised, the lateral fields slightly depressed; clypeus convex, its apical border slightly emarginate.

THORAX: Mesoscutum slightly convex, coarsely, not densely punctured, the notauli barely indicated basally by shallow, gradual depressions; scutellum always considerably raised above postscutellum, either in a pyramidal shape with culminating point, or simply convex; declivity of propodeum steep and scarcely curved; area superomedia reduced into an arched, fairly-wide, smooth, transverse carina, area posteromedia consequently basally not considerably narrowed as in the subtribe Callajoppina, but nearly parallel sided; sternauli obsolete; carinae coxales and metapleurales strongly prominent.

LEGS: Moderately long and slender.

WINGS: Areolet, as in Callajoppina, irregularly trapezoidal, not petiolate; nervulus slightly postfurcal, not oblique; radius long, markedly curved at base.

ABDOMEN: Of females amblypygous, apically blunt; tergites 1-5 of females (fig. 70)



Fig. 69. *Trogus pennator* (Fabricius) (female). Head, dorsal view.

and tergites 1-6 of males (fig. 71) extremely heavily sclerotized, extremely coarsely sculptured, with highly-specialized, plastic features; postpetiole subtriangular, with prominent, longitudinal carinae reaching to near the apex, extremely coarsely, irregularly reticulate rugose punctate; gastrocoeli deeply impressed, transverse, about as wide as their interspace; tergites 2-5 of females, 2-6 of males extremely coarsely and densely reticulate rugose and longitudinally striate, separated from each other by deep incisions, their lateral edges becoming gradually more prominent and bulging toward the apex of each tergite, separating the almost perpendicularly sloping, lateral surfaces of tergites from their dorsal surfaces; the latter are medially slightly raised, with slightly concave areas between the raised central part and the bulging, latero-apical elevations; tergites 6 and 7 of females, 7 of males almost without sculpture, smooth, without plastic features; ovipositor entirely hidden.

DISTRIBUTION: Holarctic, Oriental, and (according to Townes and Townes, 1966) Neotropic Regions; lacking in the Ethiopian Region south of the Sahara.

HOSTS: Species of the genus *Papilio*; various of the larger species of Nymphalidae have been recorded occasionally; they are to be considered as emergency hosts.

1. *Trogus pennator* (Fabricius) Fig. 67-71

SYSTEMATICS: According to our present concept, *Trogus pennator* Fabricius is a uniform, homogeneous species, identified morphologically by the characters of the genus *Trogus*, chromatically by the entirely or almost entirely ferruginous color of the body and by the strongly infuscated wings, distributed without geographical variation from coast to coast over the entire Nearctic Region (except the arctic parts) and parasitizing 9 different species of *Papilio*, the larvae of which feed on a variety of very different plants. This would represent a very unusual, if not unique, case within the North American fauna of the Ichneumoninae and even in the fauna of the world. In 1962 (p. 849-850) I expressed some doubt about the concept of the species as defined above, and I mentioned 2 specimens reared in Canada from *Papilio troilus* Linnaeus, which differ

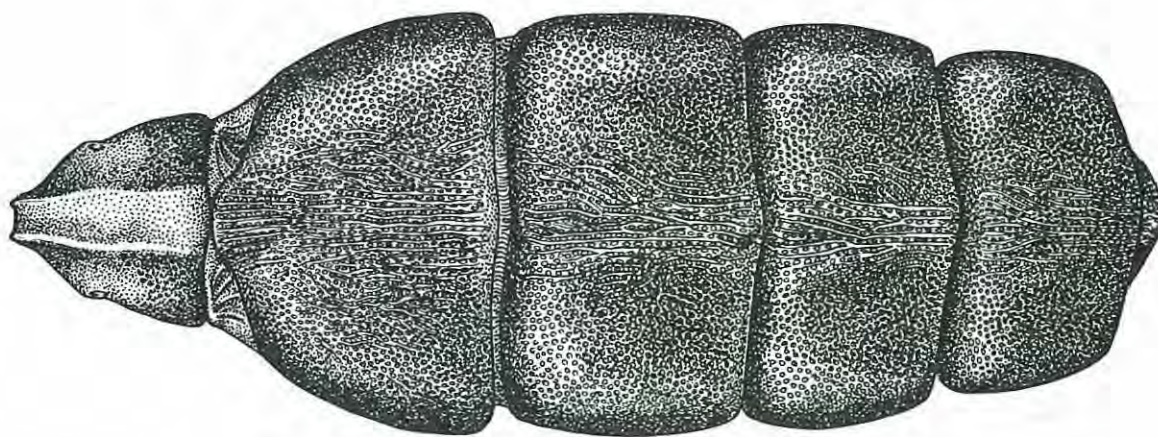


Fig. 70. *Trogus pennator* (Fabricius) (female). Abdomen, dorsal view.

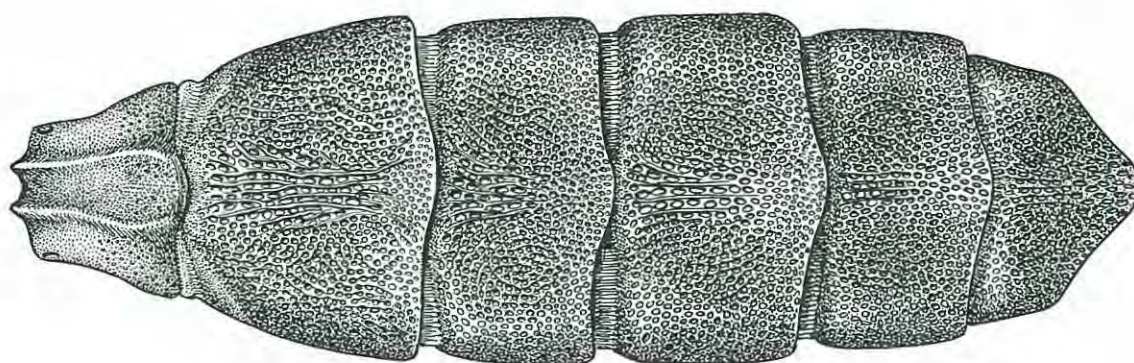


Fig. 71. *Trogus pennator* (Fabricius) (male). Abdomen, dorsal view.

from the rest of the northeastern specimens by simply convex instead of pyramidal scutellum. It is noteworthy that these specimens are distinguished from the northeastern subspecies (*p. argutus*) treated below not only in the structure of the scutellum but apparently also in host preference.

Recent examination of series of specimens from Florida and their comparison with series from New England (Maine) revealed tangible structural differences between these 2 series, a fact which seems to support my suspicion and which at least proves that not all the North American ferruginous *Trogus* populations are congruent.

I sent a series of each of the 2 populations to H. Townes, asking him for his opinion about the case. He wrote that he "could see the differences. . ." and that he "probably could distinguish Florida specimens from Maine specimens with some consistency." He did not, however, "feel compelled to consider the differences of a species nature." The fact that

there is some structural differentiation between the 2 populations is thus indisputed. It is my personal conviction that this established fact calls for taxonomic distinction of these 2 forms. Whether their differentiation is regarded as specific or subspecific appears to be at present of minor importance as it can be established only by future, more comprehensive investigation. In this paper I am tentatively adopting the subspecific hypothesis.

The population from California, represented by *Macrojoppa californica* Cameron, evidently is distinguished from the southeastern and northeastern subspecies as well, though closer to the latter than to the former. This form, therefore, is omitted in the quotations of the following subspecies.

HOSTS: *Papilio glaucus glaucus* Linnaeus, *P. polyxenes asterius* Stoll, *P. rutulus* Lucas, *P. troilus* Linnaeus, *P. eurymedon* Lucas, *P. zelicaon* Lucas, *P. brevicauda* Saunders, *Graphium marcellus* (Cramer).

**1a. *Trogus pennator*
pennator (Fabricius)
Map 140**

Ichneumon pennator Fabricius, 1793:155, female. Townes, 1961:109, female (discussion and location of type).

Trogus vulpinus Gravenhorst, 1829:389, female. Hopper, 1939:318 (description, hosts, distribution). Townes, 1961 et al.:113, female (location of type, type locality).

Trogus exesorius Brullé, 1846:298, female, male. Townes, 1961 et al.:113, male (designation of lectotype).

Ichneumon asteriae Jaeger, 1859:240.

Trogus pennator Townes, 1944:427-428 (synonymy and quotations to 1944). Townes and Townes, 1951:306 (synonymy, quotations, hosts). Heinrich, 1962:849-850, female, male.

Holotypes: *Ichneumon pennator*, female, Georgia; Univ. Zoological Museum in Copenhagen. *Trogus vulpinus*, female, ?New Jersey; Wrocław, Poland. *Trogus exesorius*, male, Carolina; MNHN. *Ichneumon asteriae*, sex unknown, ?New Jersey; lost.

SYSTEMATICS: Not all of the synonyms listed above are sufficiently established. Particularly *Trogus vulpinus* Gravenhorst and *Ichneumon asteriae* Jaeger must be considered as doubtful, as the type localities of these species are uncertain, and an examination of the types was not possible. The synonymy of *Trogus exesorius* Brullé is based on the type locality (Carolina); which is within the known range of this subspecies. *Macrojoppa californica* Cresson is considered as much likely a distinct subspecies and therefore omitted from the list.

Trogus pennator pennator is a southeastern form which differs from the northeastern subspecies (described below) rather markedly in structure of the scutellum and particularly in the structure of the 5th tergite of females; it is also on the average somewhat larger; both forms differ additionally ecologically.

Two specimens (female and male) collected 23-VIII- and 29-VIII-1969 in Highlands Hammock State Park, Highlands Co., Florida, and a 2nd female, collected 15-VI-1970 near Lucedale, George Co., Mississippi, differ from all *pennator pennator* specimens recorded in this paper from the southeastern states, by (1) sharply-pointed, pyramidal scutellum, (2) complete, lateral edge of the 5th tergite of the female, and (3) by markedly larger size. These differences, together with the unusually late date of the capture of the 2

matching sexes in Florida, suggest the possibility that these specimens represent a distinct form.

FEMALE and MALE: Length 16-20 mm. Dark ferruginous; inner and outer orbits more or less extensively, and tibiae and tarsi faintly, yellowish tinged; wings uniformly and deeply infuscated; flagellum ferruginous, sometimes dorsally infuscated toward apex or more extensively.

Scutellum only moderately raised, either merely convex or with a recognizable but low and blunt culminating tip, rather gradually sloping from the latter to all sides; dorsal surface of 5th tergite of females only basally delimited by bulging lateral edges from steeply declivous, flat, lateral surfaces; in the apical part the dorsal surface slopes in a gradual curve downward to the ventral edges of the 5th tergite without being separated by a prominent, longitudinal, lateral ridge from the lateral surfaces.

DISTRIBUTION (map 140): Georgia (type locality) and southwards to southern Florida, north at least to North Carolina, probably further, west at least to Arkansas. ARKANSAS. Garland Co.: 2 females, Ouchita Mts., 11-17-V-1962 and 3 females, 1 male, 16-23-V-1972, and 4 females, 25-30-V-1972, G. Heinrich and D. Shaneck. FLORIDA. Alachua Co.: 1 female, Archer, 22-IV-1961, R. E. Woodruff. Clay Co.: 1 male, Gold Head Branch State Park, 3-5-VII-1972, G. Heinrich. Dade Co.: 1 female, Miami, 7-V-1932, O. D.



Map 140. *Trogus pennator pennator* (Fabricius)

Link. Highlands Co.: 1 female, Sebring, 10-IV-1960, H. V. Weems; 4 males, Archbold Biological Station, 25-II-29-V-1967, and 1 female, 5-IV-1968, G. Heinrich. Lee Co.: 1 female, Ft. Myers, 20-IV-1968, D. Radtke. Liberty Co.: 1 female, Torreya State Park, 15-IV-1967, H. V. Weems. Pasco Co.: 1 female, 12-III-1957, H. V. Weems. Pinellas Co.: 1 female, St. Petersburg, 16-VI-1951, G. Heinrich. NORTH CAROLINA. Wake Co.: 1 female, Raleigh, 10-VI-1951, G. Heinrich. TENNESSEE. Henderson Co.: 1 female, 1 male, Natchez Trail State Park, 7-12-VI-1972, G. Heinrich and D. Shaneck. CGH II and FSCA.

ECOLOGY: H. Townes (in correspondence) assumed that *Papilio palamedes* Drury, a species feeding mainly on *Magnolia*, is the favored host of the southeastern populations of *pennator*. I did not see any host records in Florida, but all specimens I collected there were found in hammocks where at least some magnolia trees were present.

**1b. *Trogus pennator argutus*,
new subspecies**

FEMALE and MALE: General color a shade paler than in the nominate form; average size markedly smaller; abdomen comparatively narrower; scutellum forming a considerably raised pyramid, with a long, sharply-pointed, culminating tip, steeply declivous from its summit to all sides. Fifth tergite of female with dorsal surface laterally clearly separated from the vertically sloping, flat, lateral surfaces by a longitudinal, prominent edge continuing to the extreme end of the tergite.

Holotype: female, Maine, Franklin Co., Dryden, 17-IX-1951. Allotype: male, same data except 26-VI-1952. Paratypes: all same locality: 2 females, 17-V-1952 and 10-IX-1951; 1 male, 9-IX-1951; 3 males, 17-20-VI-1952. All specimens in CGH II.

DISTRIBUTION: Known only from the type locality.

HOSTS: Frequently found flying above open meadows and overgrown fields; apparently specialized on umbellifer-feeding *Papilio* larvae as hosts.

VII. Tribe Phaeogenini (Foerster)

Phaeogenoidae Foerster, 1868:144.

Phaeogenina Woldstedt, 1877.

Phaeogenini Ashmead, 1900:1-120. Townes, 1944:298. Perkins, 1959-1960:68-71. Walkley 1967:130.

Type genus: *Phaeogenes* Wesmael.

Alomyini Townes and Townes, 1951:276.

SYSTEMATICS: The tribe Phaeogenini contains only small forms, among them the very smallest of the subfamily. Its basic characters are the small and circular spiracles of the propodeum, in combination with a clypeus convex from side to side and in longitudinal direction as well. The wing venation shows, as a rule, a pentagonal areolet with intercubiti widely separated in front and a tendency for abbreviation of the radial cell and stigma. Characteristic for the majority of forms is also the carination of the propodeum with usually hexagonal area superomedia, narrowed from costulae toward area basalis, nearly parallel sided behind costulae and often longer than wide.

The characters mentioned above apply particularly to the genus *Phaeogenes* and all genera closely related to it, that is, to the tribe Phaeogenini sensu stricto. Mainly on account of their small, circular propodeal spiracles, several rather heterogenous genera usually are attributed to this tribe, as explained by Perkins (1959-1960).

In contrast to the Ichneumonini, the Phaeogenini are chromatically rather monotonous and show only restricted sexual dichromatism; they are red (of various shades), or black, or display both colors in combination, usually without or with very restricted white marks.

The North American Phaeogenini were not included in Heinrich's "Synopsis of Nearctic Ichneumoninae Stenopneusticae" (1961-1975), and a monographic treatment of the tribe never has been published. This lack of a fundamental monograph precludes completeness of the treatment of the Phaeonini in this publication.

As I have not included the Phaeogenini, so far, in the field of my specialized taxonomic research and into my previous publications, Perkins' excellent treatment of the British fauna of this tribe (1959-1960), and particularly his generic arrangement, has been accepted without change in this publication. Several species recorded below from the southeastern states have been identified by H. Townes, a favor for which I express my gratitude.

I do not believe that the genus *Alomya* Panzer could be included in the same tribe with the genus *Phaeogenes* Wesmael.

DISTRIBUTION: Worldwide.

Key to genera of Phaeogenini of the southeastern states

1. Ovipositor strongly projecting, longer than tergites 6 and 7 together; 1st segment of flagellum strongly elongate, in both sexes at least 6 times as long as apically wide; malar space in both sexes considerably longer than width of mandible base. (Gastrocoeli obsolete, thyridia fairly distinct, narrower than their distance from the base of 2nd tergite; sculpture of head, thorax, and abdomen finely coriaceous, opaque; color almost uniformly pale ochreous orange in both sexes; length 6 mm)....
..... 51. *Terebraella*, new genus
- Ovipositor not, or at the most slightly projecting; 1st segment of flagellum and malar space much shorter. 2
2. Gastrocoeli and thyridia obsolete.... 3
- Gastrocoeli and thyridia distinct, transverse. 5
3. Carinal junction situated next to lower corner of mandible base; mandibles fairly slender, with straight lateral edges, more or less tapering toward apex; small species, 4-6 mm long. (Basic color of head and thorax black in both sexes; clypeus usually orange in females or ivory in males).
..... 50. *Dicaelotus* Wesmael
- Carina genalis meets carina oralis behind lower corner of mandible base and in a considerable distance from the latter; mandibles broad and rather long, nearly parallel sided, or else clearly constricted beyond base; more elongate and more conspicuous species, 6-10 mm long. (Basic color of thorax sexually dichromatic). 4
4. Mandibles conspicuously constricted behind base in females, in males only with an indication of an emargination on lower edge of mandible beyond base; abdomen of female semiamblypygous, the hypopygium covering the basal part of the slit of the ovipositor, the latter not projecting.
..... 47. *Colpognathus* Wesmael
- Mandibles in both sexes parallel sided, without constriction or emargination behind base; abdomen of female clearly oxygygous, with the ovipositor somewhat projecting.
..... 48. *Centeterus* Wesmael
5. Clypeus separated from the median field of face by a distinct, transverse depression; apex of clypeus normal and not

- depressed.
..... 46. *Phaeogenes* Wesmael
- Clypeus not separated from the median field of face by a transverse depression; clypeus apically sharply depressed.....
..... 49. *Diadromus* Wesmael

46. Genus *Phaeogenes* Wesmael

Fig. 72

Phaeogenes Wesmael, 1844:180. Townes and Townes, 1951:276-278 (22 Nearctic species). Townes et al., 1961:335 (3 species from Java, Ceylon, and Australia, all with question marks). Townes, et al., 1965:416-419 (19 eastern Palearctic species, 9 with question marks). Townes and Townes, 1966:216 (3 species from Mexico and Chile, all with question marks).

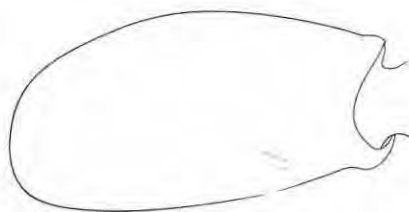


Fig. 72. *Phaeogenes hebrus* (Cresson) (female). Coxa III, inner view.

Type species: (*Phaeogenes primarius* Wesmael =) *Ichneumon semivulpinus* Graenicher; designated by Ashmead, 1900.

SYSTEMATICS: A rather clearly defined genus, distinguished by large and distinct transverse thyridia, with their interspace narrower than 1 of them, by distinct and complete carination of the horizontal part of propodeum, with a hexagonal, usually longer than wide area superomedia, by normal, bidentate mandibles, and a structure of face and clypeus as described below. Females display more often than not a tooth-like or otherwise-shaped protrusion (fig. 72) apically on inner side of coxa III, a specifically varying structure of particular taxonomic value; as this character is absent in males, a satisfactory classification and specific association of many males of this genus has not been achieved.

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Short; of females filiform or subfiliform, at the most slightly attenuated toward apex, not widened beyond middle, with the 2nd segment usually distinctly longer than the 1st; of males with cylindrical segments, without transverse bristle ridges, evenly pilose, with a short row of narrow tyloids, often hard to recognize under the dense pilosity.

HEAD: Transverse in vertical view; temple

profile always bulging, rarely narrowed behind eyes, sometimes somewhat widened; occiput and temples never abruptly declivous but convex behind ocelli and margin of eye and sloping down toward carina occipitalis in a gradual curve; cheeks in lateral view wide to very wide, convex; malar space always markedly shorter than width of mandible base; cheek profile in frontal view short, curved, and narrowed toward mandibles; frons never concave, sometimes rather convex, the antennal cavities subobsolete; face and clypeus convex from side to side, the former with more or less strongly protruding median part; clypeus convex also in longitudinal direction, separated from median part of face by a more or less distinct transverse depression, its apical margin forming a flat bow from side to side, without median projection or depression, its side as a rule distinctly depressed; mandibles normal, fairly stout, with 2 subequal, apical teeth.

THORAX: Mesoscutum moderately convex, not or slightly longer than medially wide; notauli distinct only at base, sternauli rather sharply impressed; scutellum not, or very slightly raised above postscutellum, in males often more so than in females, laterally not carinate; propodeum of the clearly broken type, the horizontal part medially as a rule about as long as the area posteromedia, sometimes somewhat shorter, in males more abbreviated than in females; spiracles small and circular; carination distinct and complete; area superomedia with costulae usually distinctly before middle, hexagonal, narrowed from costulae toward area basalis, sometimes also slightly toward area posteromedia; basal furrow narrow; costulae oblique.

LEGS: Short and fairly stout; coxa III of females often with tooth-like or otherwise-shaped projection.

WINGS: Nervulus interstitial or postfurcal; areolet pentagonal, the intercubiti widely separated in front; radius short.

ABDOMEN: Of females oxygyous, the ovipositor usually slightly projecting; postpetiole moderately convex, without clearly defined, median field, usually nearly smooth, with some scattered punctures or fine, irregular rugosity, sometimes finely coriaceous; thyridia large and wide, with narrowed interspace.

CHROMATIC CHARACTERS Basic color usually ferruginous red and black in combination, sometimes predominantly ferruginous red, rarely entirely black or ferruginous; few species with very restricted

white marks on anterior coxae and trochanters, or mandible base, or thorax; in males exceptionally face and clypeus white.

DISTRIBUTION: Apparently Holarctic, as numerous species are described from the Palearctic and Nearctic Regions while the generic position of all 6 species, listed by Townes from the Neotropical and Indo-Australian Regions together, is still uncertain.

HOSTS: Mainly Tortricodea; also Yponomeutoidea (including Sesiidae), Pyralidoidea, and Gelechioidea.

Key to species of *Phaeogenes* Wesmael of the southeastern states

FEMALES

1. Abdomen uniformly black. (Coxae III without projections or elevated carinae on ventral side; length 7-10 mm).
..... 7. *ater* Cresson
- Abdomen partially or entirely red or orange. 2
2. Tergites 2 and 3 distinctly, sometimes coarsely punctured; gastrocoeli fairly deeply impressed, with narrow interspace. (Flagellum subfiliform, slightly attenuated toward apex).
(Genus *Phaeogenes* sensu stricto) .. 3
- Tergites 2 and 3 very finely sculptured, without puncturation, opaque or subopaque; gastrocoeli shallow, their interspace less narrowed. 5
3. Coxae III apically on ventral side with a conspicuous projection, which is spoon-like, convex toward apex, and rounded at the end; mandibles, except teeth, always ivory; abdomen uniformly orange ferruginous, the apical tergites, at the most, slightly infuscated. (Length 8-9 mm).
..... 6. *gilvilabris* Allen
- Coxae III apically on inner side with a short, unobtrusive, obtusely triangular projecting carina; mandibles always black; abdomen red, tergites 5-7 black. (Length 10-11 mm).
..... 1. *hebrus* (Cresson) 4
4. Head and thorax black including collare, tegulae ferruginous or brown; all coxae and trochanters uniformly ferruginous red, anterior coxae and trochanters sometimes infuscated; puncturation on tergites 2-4 less coarse than in alternative subspecies.
..... 1. a. *hebrus hebrus* (Cresson)
- Head and thorax black, except white collare, tegulae white; coxae I and II

- reddish white, trochanters I and II white; puncturation on tergites 2-4 coarser and denser than in alternative subspecies.
- 1 b. *hebrus floridae*, new subspecies
5. Coxae III with conspicuous, triangular projection; flagellum subfiliform, a trifle attenuated toward apex; length 7-8 mm. (Orange ferruginous, the upper parts of head and the tergites 6 and 7 black)...
..... 3. *trianguliferens*, new species
- Coxae III without projections; flagellum exactly filiform; smaller species, about 6 mm long. 6
6. Head and thorax black, only clypeus, mandibles, extreme end of pronotal ridge, and subalarum orange; tergites 1 and 5-7 black. (Flagellum with dorsal white annulus).
..... 5. *parvus* (Provancher)
- Head, thorax, and abdomen not or much less extensively black. 7
7. Vertex, occipital and temple regions black; flagellum with distinct, dorsal, white annulus; antennal cavities not depressed, their upper margin not forming a bilobate carina. (Apical 1/3 of 5th tergite and tergites 6 and 7 black).
..... 4. *brevior*, new species
- Head without black parts; flagellum, at most, with faint indication of a pale, dorsal annulus; antennal cavities slightly depressed, their upper margin forming a bilobate carina, which, seen in vertical view, shows on each side a small, bluntly triangular-projecting elevation.
..... 2. *walshiae* Ashmead 8
8. Abdomen uniformly orange ferruginous; flagellum uniformly orange ferruginous.
..... 2 a. *walshiae walshiae* Ashmead
- Apical tergites black; flagellum with faint indication of a pale dorsal annulus on segments 8-10.
... 2 b. *walshiae australis* (Cushman)

1a. *Phaeogenes hebrus*
hebrus (Cresson)

Fig. 72

Ichneumon hebrus Cresson, 1867:306, female, male.

Phygadeuon insignis Provancher, 1875a: 179, 182, female.

Ichneumon ustus Provancher, 1882:305, 324, female.

Phaeogenes hebrus Townes, 1944:300, 301, female, male (quotations, synonymy).

Townes and Townes, 1951:277, female, male (distribution).

Holotypes: *Ichneumon hebrus*, female, Illinois; ANS. *Phygadeuon insignis*, female, Quebec, and *Ichneumon ustus*, female, Quebec; both types, Provincial Museum Quebec.

SYSTEMATICS: Females of this species are particularly distinguished in structure by an oblique, fairly short and unobtrusive, obtusely triangular-projecting carina, situated near the apex of coxae III on their interior side (fig. 72). Females from Florida differ from specimens from northeastern North America slightly in color pattern and also in sculpture; the Florida population, therefore, is treated as a distinct subspecies.

FEMALE: Length 10-11 mm. Head and thorax black, tegulae ferruginous or brown; abdomen red, including the 1st segment, tergites 5-7 black, the 5th laterally more or less extensively red; legs red, including all coxae and trochanters, sometimes the latter infuscated; apices of femora III and of tibiae III broadly black; flagellum tricolored, black, with complete, white annulus on segments 7 (or apex of 7) to 11; segments 1-3, sometimes to 4, ferruginous; scape dorsally on exterior side (except basally) and the postanellus black.

FLAGELLUM: Subfiliform, slightly attenuated toward apex, with 24-25 segments, the 1st about twice as long as apically wide, the 2nd slightly longer than the 1st, in lateral view the 12th approximately square, none wider than long.

HEAD: Temple profile in vertical view neither narrowed nor widened behind eyes; frons plane, very coarsely and densely, irregularly rugose punctate; antennal cavities barely indicated, with dense, transverse, sub-parallel striation; rest of head densely and coarsely punctured, the clypeus less densely than the face; the inflected apical margin of the clypeus (to be seen from below) densely punctured; clypeus laterally slightly depressed; malar space about 1/3 as long as width of mandible base, carina genalis apically curved inward and meeting the slightly raised carina oralis before mandible base in a distance subequal to malar space.

THORAX: Notauli basally indicated, ster-nauli on mesosternum distinct; area postero-media nearly as long as horizontal part medially; area superomedia markedly longer than wide, with costulae before middle,

roughly coffin shaped, distinctly narrowed from costulae toward area basalis and slightly also toward area posteromedia; entire thorax, including speculum and scutellum, coarsely and densely punctured, the areae posteroexternae very coarsely reticulate rugose.

LEGS: Moderately stout; femora III moderately thick; coxae III with elevated carina as described in systematics.

WINGS: Nervulus slightly postfurcal; radius straight.

ABDOMEN: Postpetiole finely, irregularly coriaceous rugose, the lateral fields with some coarse punctures; gastrocoeli and thyridia distinct, with narrowed, longitudinally-rugose interspace; tergites 2 and 3 more or less densely and coarsely punctured, finely coriaceous between punctures; the 4th tergite less densely and more finely punctured than the 3rd.

MALE: (specimens from Maine). Length 10 mm. Head and thorax uniformly black, including tegulae; legs black, including all coxae and 1st trochanters; apical margin of 1st trochanters I narrowly white; all 2nd trochanters, apices of femora I, tibiae I predominantly, and ventral side or most of tarsi I dull brownish; abdomen black, except ferruginous tergites 2 and 3 and usually most of postpetiole; tergites 2 and 3 varying individually to partially or predominantly black; flagellum black, ventrally brown, with complete white annulus on segments 10-14 or 15; scape black.

FLAGELLUM: With 26-28 segments and with a row of indistinct, short, and narrow tyloids on segments about 6-16.

DISTRIBUTION: Transcontinental in Transition and Upper Austral Zones (Townes and Townes, 1951).

1b. *Phaeogenes hebrus floridae*, new subspecies

Map 141

FEMALE: Head and thorax black, except white collare and tegulae; trochanters I and II white; coxae I and II reddish white; only the extreme apex of femora III and the tibiae III dorsally infuscated; elevated carina on interior, apical side of coxae III only slightly raised toward the end; temples, cheeks, and tergites 2-4 more coarsely and more densely punctured than in the northeastern subspecies.

Holotype: female, Florida, Highlands Co., Highlands Hammock State Park, 25-VI-1968, G. Heinrich.

Paratype: Florida, Putnam Co., 1 female, Red Water Lake (6 mi. east Hawthorne), 23-VI-1969, G. Heinrich. Both specimens in CGH II.

DISTRIBUTION (map 141): Known only from type localities.



Map 141. *Phaeogenes hebrus floridae*, n. subsp.

2 a. *Phaeogenes walshiae* *walshiae* Ashmead

Phygadeuon walshiae Riley and Howard, 1890:153 (host; Illinois); nomen nudum.

Phaeogenes walshiae Ashmead, 1896:205, male, female (host; Illinois). Townes, 1944: 303, female, male. Townes and Townes, 1951:278, female, male (synonymy, hosts, distribution).

Phaeogenes ineptifrons Gahan, 1919:113, male, female (host; Washington, D.C.).

Holotypes: *Phaeogenes walshiae*, female, Illinois, and *Phaeogenes ineptifrons*, female, Washington, D.C.; both types USNM.

SYSTEMATICS: A slender and very small species, distinguished by: (1) very finely coriaceous, impunctate sculpture of the abdomen, mesothorax, and head, (2) lack of elevations and projections on coxae III of female, (3) peculiar structure of head as described below. The 2 subspecies differ in the color of the abdomen.

FEMALE: Length 6 mm. Light ferruginous orange, including entire legs and

flagellum, apical segments of abdomen black.

FLAGELLUM: Short, slender, filiform, not distinctly ventrally flattened beyond middle and not widened or attenuated toward apex, slightly narrowed toward base, with 18 segments, the 1st nearly twice as long as apically wide and somewhat shorter than the 2nd, none wider than long.

HEAD: Vertex and temples forming between eyes and carina occipitalis a broad, strongly convex surface without distinct, occipital declivity; temple profile not narrowed behind eyes, strongly curved; frons evenly convex; antennal cavities only slightly depressed, their upper margins forming a transverse, elevated, bilobate carina which (if the head is seen in vertical view) shows a bluntly, triangularly projecting elevation on each side; cheeks in lateral view very wide and strongly convex; carina genalis runs parallel to hind margin of eye down to about level with lower end of eye, then turns in a steep curve toward mandible base; mandibles broad, with strong teeth, the apical tooth not much longer than the subapical; malar space short, about 1/3 as long as width of mandible base; cheeks, in frontal view, strongly curved toward mandible base, head in frontal view approaching a circular outline; finely alutaceous, without puncturation, frons above antennal depression densely, transversely striate.

THORAX: Mesoscutum moderately convex, very finely coriaceous, without puncturation, glossy; about anterior 1/4 of notauli fairly distinct; scutellum flat, glossy, impunctate; horizontal part of propodeum and declivity irregularly rugose and punctate, with weak but complete carination, the area superomedia longer than wide; area posteromedia somewhat longer than the horizontal part medially, with rather indistinct lateral carinae; sternauli distinct; pleura extremely finely coriaceous, glossy, nearly impunctate, the speculum somewhat protruding, nearly smooth, depression below speculum deep and large.

LEGS: Moderately short; coxae III without scopae and protrusions.

WINGS: Nervulus interstitial or slightly postfurcal; areolet pentagonal, intercubiti widely separated in front; radius short and straight; stigma wide, blackish, whitish at base.

ABDOMEN: Long and narrow, impunctate, finely coriaceous, tergites 1-3 subopaque; gastrocoeli superficial, thyridia large and wide, with narrow interspace.

MALE: Agrees in structure and color with female, except that the lateral sutures of scutella and of posterior part of mesoscutum, and the tips of flagella are somewhat infuscated.

DISTRIBUTION: Illinois, Ohio, Pennsylvania, New Jersey, Maryland, Delaware, Virginia (Townes and Townes, 1951).

HOSTS: *Walshia amorphella* Clemens, *Ancylis comptana* (Froelich), *Epiblema strenuana* (Walker), *Grapholita molesta* (Busck).

2 b. *Phaeogenes walshiae* *australis* (Cushman)

Map 142

Proscus walshiae var. *australis* Cushman, 1933:5, female, male.

Phaeogenes walshiae australis, Townes, 1944:304, female, male. Townes and Townes, 1951:278, female, male. Stegmayer, 1971:270 (host).

Holotype: female, Albany, Georgia; USNM.



Map 142. *Phaeogenes walshiae australis* (Cushman)

FEMALE: Uniformly light ferruginous orange, including the entire abdomen; flagellum with faint indication of a light dorsal annulus on segments 8-10.

DISTRIBUTION (map 142): Florida and Georgia. FLORIDA. Alachua Co.: Gainesville, 1 female, 11-XII-1963, F. W. Mead; 1 male, 17-XI-1966, H. V. Weems (FSCA). Dade Co.: Miami and Hialeah (Stegmaier, 1971).

3. *Phaeogenes trianguliferens*, new species

Map 143

SYSTEMATICS: The type series has been examined by H. Townes, who supposed that it represents a new species, although an ultimate certainty could not be secured without examination of all types of the genus. There is urgent need for a monographic treatment of this large and difficult group as basis for its further exploration.

Females of this species are distinguished in structure by a conspicuous, triangular (not sharply pointed), apical projection on ventral side of coxae III and by the fine and very dense, coriaceous, and opaque sculpture of tergites 2 and 3; another distinguishing character is found in the only slightly deepened gastrocoeli, each of which is only slightly wider than their interspace.

Males are well distinguished in color by the white (among other parts) face, clypeus, scutellum, and sterna, combined with black mesoscutum and upper parts of head and with predominantly ferruginous-red abdomen. Color pattern, as well as structure, shows ample analogies with the female; these analogies, together with the simultaneous appearance of both sexes at the same locality, seem to confirm their association sufficiently.

FEMALE: Length 7-8 mm. Ferruginous orange, with black upper parts of head (frons, vertex, occiput, and temples) and black tergites 6 and 7; mesoscutum, face, clypeus, and cheeks a shade darker ferruginous than the rest; thorax with the following black or blackish parts: anterior end of median lobe of mesoscutum and marks on posterior parts of lateral lobes, basal furrow of scutellum, and axillary troughs more or less extensively; mandibles, except teeth, faintly ivory tinged; all 1st trochanters and coxae I and II ivory or orange-tinged ivory; flagellum orange, with white, ventrally orange tinged, annulus on segments 7-9, blackish infuscated beyond annulus; scape orange.

FLAGELLUM: Subfiliform, slightly attenuated toward apex, fairly slender, with 21-23 segments, the 1st nearly 2-1/2 times as long as apically wide and markedly shorter than the 2nd, the 10th in lateral view nearly square.

HEAD: Temple profile somewhat narrowed behind eyes, slightly curved; cheek profile distinctly narrowed toward mandible base, slightly curved; malar space as long as width of mandible base; carina oralis meets carina

genalis behind inferior corner of mandible base; carina oralis distinctly raised; clypeus smooth and glossy, separated from the face by a distinct depression; median field of face distinctly protruding; face and frons densely punctured, densely and finely, irregularly rugose between punctures.

THORAX: Mesoscutum approximately as long as medially wide, flat, with moderately dense, fine puncturation and very finely rugose sculpture between punctures, glossy; horizontal part of propodeum medially barely longer than area posteromedia; area superomedia somewhat longer than wide, with the more or less indistinct costulae before middle, narrowed from costulae toward area basalis and not clearly separated in front from the latter; areae dentiparae more than twice as long as medially wide, nearly parallel sided, the short carinae dentiparae interiores meeting the lateral carinae of area posteromedia far beyond apical corner of area superomedia; horizontal part of propodeum finely, irregularly rugose punctate; sternauli on mesosternum sharply impressed.

LEGS: Femora III moderately thick; coxae III ventrally finely and densely punctured, with a conspicuous, triangular, apical projection.

ABDOMEN: Postpetiole very densely and very finely coriaceous and extremely finely longitudinally rugose, opaque; tergites 2 and



Map 143. *Phaeogenes trianguliferens*, n. sp.

3 extremely densely, evenly, and finely sculptured, with sparse, extremely fine punctures, opaque, the 4th tergite slightly less densely sculptured and subopaque; gastrocoeli and thyridia distinct though not deeply impressed, each slightly wider than their interspace.

MALE: Length 7-8 mm. Head black, the following ivory: mandible except teeth, face, clypeus, malar space, and lower part of cheeks; thorax ivory, in allotype the pleura and propodeum only slightly orange tinged, in paratypes from Tennessee pleura and propodeum clearly orange; mesoscutum, basal furrow of scutellum, and axillary troughs always black, the mesoscutum with or without basal ivory marks on notauli and with longitudinal, more or less complete, orange stripes between median and lateral lobes; below subalarum a black mark of variable size, almost obsolete in allotype from Arkansas, more extensive and sometimes including speculum in specimens from Tennessee; legs and abdomen light orange ferruginous; all coxae and trochanters ivory, the coxae III sometimes varying to orange, the apical tergites and the base of petiole sometimes blackish infuscated; ventral side of femora I and II and the tibiae and tarsi I and II sometimes predominantly ivory; flagellum orange, brownish infuscated on dorsal side, ventrally pale ochreous; scape and anellus ventrally ivory, dorsally infuscated.

Structure and sculpture generally as in female; the malar space much shorter, only about 1/3 as long as width of mandible base; the fine and opaque sculpture of tergites extends onto the 5th tergite. Flagellum with 25 segments.

Holotype: female, Arkansas, Garland Co., Ouachita State Park, 10-18-V-1972, G. Heinrich, D. Shaneck. Allotype: male, same data except 16-21-V-1972. Paratypes: 1 female, same data, 18-28-V-1972 (CHT). Tennessee. Henderson Co.: 2 males, Natchez Trail State Park, 13-20-VI-1972. All specimens in CGH II unless noted otherwise.

DISTRIBUTION (map 143): Known only from Arkansas and Tennessee as outlined above.

4. *Phaeogenes brevior*, new species Map 144

SYSTEMATICS: The holotype has been examined by H. Townes, who believes that it may represent a new species, under the reservation expressed already in the systematics of *trianguliferens* Heinrich. This

species shares with *trianguliferens* (1) the very fine and dense sculpture of tergites 2 and 3, (2) the shallow gastrocoeli with the interspace about as wide as 1 of them, and (3) the short mesoscutum of about equal length and width. The species is distinguished in structure by a short propodeum with the horizontal part medially markedly shorter than the declivity, by relatively shorter mesosternum with shorter and less pronounced sternauli, and by lack of a projection on ventral side of coxae III.



Map 144. *Phaeogenes brevior*, n. sp.

Neither the preceding species nor this 1 agrees in the structure of gastrocoeli and in the alutaceous sculpture of anterior tergites with the type species of *Phaeogenes*, the European species *semivulpinus* Gravenhorst.

FEMALE: Length 6 mm. Orange ferruginous, the following black: vertex behind ocelli together with occipital and temple regions, about apical 1/3 of 5th tergite, and tergites 6 and 7; coxae and trochanters I and II ivory; coxae and trochanters III and base of mandibles ivory-tinged orange; flagellum tricolored, with complete, white annulus on segments 7-10, scape and segments 1-4 orange ferruginous, segments 5 and 6 blackish on dorsal side, segments beyond annulus black.

FLAGELLUM: Short, filiform, apically not attenuated, with 20 segments, the 1st fully

twice as long as apically wide and slightly shorter than the 2nd; in lateral view, the 7th segment square.

HEAD: Temple profile not narrowed behind eyes, strongly curved; frons distinctly convex; cheek profile slightly narrowed toward mandibles; cheeks in lateral view rather wide and strongly convex; malar space slightly longer than width of mandible base; mandibles fairly wide, with subequal apical teeth, the lower only slightly shorter than the upper; clypeus separated from the median field of face only by a slight depression; face, frons, vertex, and occipital region with dense and very fine, coriaceous sculpture and sparse, very fine punctures.

THORAX: Mesoscutum barely as long as medially wide, rather densely punctured, glossy between punctures; scutellum likewise sculptured, with sharp, lateral edges at base; propodeum short, the declivity medially distinctly longer than the horizontal part; area superomedia slightly longer than wide, with costulae far before middle, narrowed from costulae toward basal furrow, the apical bordering carina obsolete; lateral carinae of area posteromedia also obsolete; sculpture of propodeum finely and very densely rugose punctate; mesosternum fairly short, sternauli on the mesosternum short, not pronounced.

LEGS: Moderately slender; coxae III ventrally densely punctured, without projections, but on inner side beyond middle with an unobtrusive, slightly-elevated, oblique edge.

ABDOMEN: Postpetiole and tergites 2-4 with dense, but extremely fine sculpture, slightly glossy; gastrocoeli and thyridia recognizable, the former shallow, each about as wide as the interspace.

Holotype: female, Georgia, Monroe Co., Forsyth, 12-IV-1971, G. Heinrich (CGH II).

DISTRIBUTION (map 144): Known only from the type locality.

5. *Phaeogenes parvus* (Provancher)

Map 145

Ischnus parvus Provancher, 1875a:112, male.

Phaeogenes farladeaui Provancher, 1882:331, female.

Phaeogenes parvus, Townes, 1944:302 (quotations; synonymy). Townes and Townes, 1951:277 (synonymy; distribution).



Map 145. *Phaeogenes parvus* (Provancher)

Holotypes: *Ischnus parvus*, male, and *Phaeogenes farladeaui*, female; Provincial Museum Quebec.

SYSTEMATICS: The female recorded below has been identified by H. Townes. This is a rather small species, disagreeing with the type species of the genus (*semitulpinus* Gravenhorst), by less distinct and smaller gastrocoeli and by very fine, coriaceous and opaque sculpture (instead of punctured and glossy between punctures) of tergites 2 and 3.

FEMALE: (description based on specimen from Tennessee). Length 6 mm. Head and thorax black, only clypeus, mandibles, the extreme end of pronotal ridge, and subalarum ferruginous orange; tergites 2-4 of abdomen and legs including coxae and trochanters, ferruginous, tergites 1 and 5-7 black; flagellum orange with white annulus dorsally on segments 7-9, the following segments dorsally blackish; scape orange.

FLAGELLUM: Short, filiform, with 19 segments, the 1st slightly more than twice as long as apically wide and somewhat shorter than the 2nd; the 7th segment in lateral view approximately square.

HEAD: Temple profile somewhat narrowed behind eyes and moderately curved; cheek profile markedly narrowed toward mandibles, with barely curved outline; malar space nearly as long as width of mandible base; carinal junction in a distance of about 1/2 the

width of mandible base from lower corner of the latter; frons very finely punctured and extremely finely coriaceous rugose, glossy; face finely and fairly densely punctured, particularly the median field.

THORAX: Mesoscutum moderately densely punctured, extremely finely coriaceous rugose between punctures, glossy; horizontal part of propodeum medially slightly shorter than area posteromedia, the latter somewhat concave; area superomedia slightly longer than wide, with costulae before middle, strongly narrowed in front; sternauli on the mesosternum rather sharply impressed.

LEGS: Moderately slender; the coxae III ventrally densely punctured, without projections or elevated carinae.

ABDOMEN: Postpetiole with vestiges of longitudinal rugosity; tergites 2-4 with extremely fine and dense, coriaceous sculpture, subopaque (in specimen from Maine the 4th tergite almost smooth); gastrocoeli shallow, their interspace slightly narrower than 1 of them.

DISTRIBUTION (map 145): Quebec, New York, Rhode Island (Townes and Townes, 1951) and northern Maine (CGH II) south to Tennessee. **TENNESSEE.** Henderson Co.: 1 female, Natchez Trail State Park, 16-21-VI-1972, G. Heinrich, D. Shaneck (CGH II).

6. *Phaeogenes gilvilabris* Allen Map 146

Phaeogenes gilvilabris Allen, 1968:627, female, male.

Holotype: female, Ithaca, New York; CHT.

SYSTEMATICS: A typical species of the genus, agreeing in structure and sculpture with the European type species, but larger in size. Females are distinguished by a conspicuous, spoon-shaped, apical projection on ventral side of coxae III; gastrocoeli large and deep, transverse, with narrow interspace; tergites 2 and 3 coarsely and moderately densely punctured, the interspace very finely coriaceous and glossy; femora III very thick, spindle shaped, in lateral view almost equally narrowed from the middle toward base and toward apex. Chromatically characteristic for the female is the black color of head and thorax, with ivory mandibles (except teeth), mark on collare, extreme apex of pronotal ridge, tegulae, and subalarum. Males differ from females in color by the white face and clypeus, but show otherwise the same basic color and white markings on head and thorax as the females.

FEMALE: Length 8-9 mm. Head and

thorax black, with the following white markings: mandibles (except teeth), mark on collare, extreme apex of pronotal ridge, tegulae, and mark on subalarum; abdomen and legs, including all coxae and trochanters, ferruginous red, the apices of femora III and of tibiae III more or less extensively black, tarsi III usually infuscated; flagellum black, segments 1-3 entirely or predominantly red brown, with complete, white annulus on segments 9-13; scape predominantly red brown.

FLAGELLUM: Subfiliform, slightly attenuated toward apex, with 26 or (usually) 27 segments, the 1st about twice as long as apically wide and slightly shorter than the 2nd, in lateral view the 9th approximately square.



Map 146. *Phaeogenes gilvilabris* Allen

HEAD: Temple profile not narrowed behind eyes, very strongly curved; cheek profile strongly narrowed toward mandible base, with curved outline; cheeks in lateral view broad and strongly convex; malar space $1/2$ as long as width of mandible base; entire head (except clypeus) coarsely and densely punctured, the clypeus sparsely punctured, frons coarsely rugose punctate.

THORAX: Mesoscutum moderately convex, base of notauli recognizable; entire thorax coarsely and densely punctured, the area posteromedia coarsely transversely rugose, area superomedia less densely punctured than the rest; propodeum with complete and

strong carination, the horizontal part medially approximately as long as area posteromedial; sternauli on the mesosternum distinct.

LEGS: Coxae III ventrally densely rugose punctate, with considerable projections, as described in systematics; femora III thick and spindle shaped.

ABDOMEN: Gastrocoeli deep and transverse, with narrow interspace, thyridia large; postpetiole with extremely fine, coriaceous sculpture and a few scattered, coarse punctures, glossy; tergites 2 and 3 with coarse, moderately dense puncturation, very finely coriaceous between punctures and somewhat shiny; tergites 4 and 5 more finely and more sparsely punctured.

MALE: (description based on 6 specimens from New York, Catskill Mts.) Length 9-10 mm. Head and thorax black, with white markings as in female, and in addition clypeus entirely, face medially only or entirely, white (usually white, with only lateral and upper margins narrowly black); abdomen ferruginous, the apical segments sometimes infuscated; legs ferruginous, all trochanters and the coxae I and II always entirely ivory white; the coxae III rarely also entirely white, usually extensively to entirely orange ferruginous, sometimes their base more or less extensively black (except on ventral side); tibiae and tarsi I and II pale yellow; tarsi III black; apices of femora III and of tibiae III more or less extensively black, the tibiae III often also basally black; flagellum black, ventrally pale brown, with complete, white annulus on segments 12 or 13 to 15 or 16, scape ventrally ivory; longish-oval tyloids on white segments recognizable.

FLAGELLUM: With 29-30 segments.

DISTRIBUTION (map 146): Michigan, New York. Pennsylvania (Allen, 1968), Wisconsin (USNM), Tennessee and Arkansas. **ARKANSAS.** Garland Co.: 1 female, Ouachita State Park, 29-30-V-1972, G. Heinrich, D. Shanek. **TENNESSEE.** Henderson Co.: 1 female, Natchez Trail State Park, 10-15-VI-1972, G. Heinrich, D. Shanek. Both specimens in CGH II.

HOSTS: Tortricidae: *Sparganothis petti-tana* (Rob.), *Archips rosanus* (L.), and *Archips semiferranus* (Wlk.), (USNM, teste R. Carlson).

7. *Phaeogenes ater* Cresson

Map 147

Phaeogenes ater Cresson, 1877:202, female. Townes, 1944:298, 299, female, male (quota-

tions, synonymy). Townes and Townes, 1951:276, 277 (distribution, hosts).

Amblyteles macrocephalus Provancher, 1886:34, male.

Holotypes: *Phaeogenes ater*, female, Missouri; ANS. *Amblyteles macrocephalus*, male, Cape Rouge, Quebec; Provincial Museum Quebec.

SYSTEMATICS: Females are unmistakably characterized in appearance by the almost uniformly black color of the entire body, including abdomen and legs, by the large head, and by the elongate, narrow abdomen, the structure of head and abdomen obviously being adaptations to the parasitism on the cryptophagous hosts. In contrast to the majority of the *Phaeogenes* species coxae III of females do not bear teeth or elevated carinae. The male shares with the female the uniformly black color of the body, including the entire head, the dorsal side of flagellum, and the entire abdomen.



Map 147. *Phaeogenes ater* Cresson

FEMALE: Length 7-10 mm. Almost uniformly black, with usually only ventral side of tibiae and tarsi I and II, and mandibles in part, dark red brown, sometimes also the extreme base of all femora, the extreme ends of anterior femora, and the apical margin of clypeus so colored; flagellum black, with complete white annulus on segments 6 or 7 or 8 to 10.

FLAGELLUM: Short, subfiliform, slightly attenuated toward apex, with 21-23 segments, the 1st slightly more than twice as long as apically wide, the 3rd somewhat longer than the 1st, in lateral view the 11th square, none wider than long.

HEAD: Large; temple profile in vertical view somewhat widened behind eyes and strongly curved; vertex broad and convex; temples swollen; cheeks in lateral view broad and convex, coarsely and densely punctured all over; malar space about 1/4 as long as width of mandible base; median field of face short, moderately protruding; frons coarsely and densely, irregularly, transversely rugose punctate; face coarsely and densely rugose punctate; mandibles broad, with subequal apical teeth.

THORAX: Mesoscutum about as long as medially wide, densely punctured, smooth and glossy between punctures; basal 1/3 of notauli distinct; sternaui on the mesosternum pronounced; propodeum shorter than in most other species of the genus *Phaeogenes*, the area superomedia usually not longer than wide; area posteromedia considerably longer than the horizontal part medially, distinctly concave and coarsely, irregularly, transversely rugose.

LEGS: Femora III fairly slender, densely punctured on exterior side; coxae III ventrally very densely punctured, without projections or elevated carinae.

ABDOMEN: Elongate, narrow, the 2nd tergite nearly parallel sided and considerably longer than apically wide, postpetiole medially finely coriaceous, with a few scattered punctures, the lateral fields with coarser and denser puncturation; gastrocoeli and thyridia distinct though not deeply impressed, their interspace somewhat narrower than 1 of them, coarsely, irregularly, longitudinally rugose, the rest of 2nd tergite finely coriaceous with fine and sparse puncturation; the 3rd and 4th tergite with similar sculpture, though usually with somewhat denser puncturation.

MALE: Color as in female, except flagellum black, ventrally brown, without white annulus.

FLAGELLUM: With 24-25 segments and with indistinct, narrow tyloids on segments 8-12 or 13.

DISTRIBUTION (map 147): From Quebec and Ontario south to Mississippi, west to Iowa and Colorado. **TENNESSEE.** Henderson Co.: 2 females, Natchez Trail State Park,

2-23-VI-1972, G. Heinrich, D. Shaneck (CGH II).

HOSTS: Sesiidae: *Synanthedon pyri* (Harris), *S. scitula* (Harris), *S. tipuliformis* (Clerck), *Podesesia syringae syringae* Harris, *Sanninoidea exitiosa* (Say).

47. Genus *Colpognathus* Wesmael

Colpognathus Wesmael, 1844:165, 174. Townes, 1944:308 (1 Nearctic species). Townes and Townes, 1951:279 (1 Nearctic species). Perkins, 1959-1960:95 (2 species from England; fig.). Townes, et al., 1965:421-422 (4 eastern Palearctic species).

Type species: *Ichneumon celerator* Gravenhorst; monobasic.

SYSTEMATICS: Females of this genus are well distinguished by the combination of the following characters: (1) mandibles more or less constricted behind base, gradually widened again behind constriction into the convex, unusually broad, main part, terminated by 2 short, subequal teeth; (2) apex of abdomen semiamblypygous, the hypopygium long, reaching fairly close to the end of abdomen; ovipositor not projecting; (3) gastrocoeli and thyridia obsolete; (4) propodeum distinctly shorter than in *Phaeogenes*, the area posteromedia markedly longer than the horizontal part medially; area superomedia about as long as wide or slightly longer than wide; (5) pronotal collar short (cf. Perkins, 1959-1960, fig. 272). Additional characters are the short and stout, filiform flagellum and the lack of projections or elevated carinae on coxae III.

Only the 3rd of the above listed striking 5 generic characters of the female is shared by the male, although a few others are slightly indicated.

From the closely related genus *Centeterus* Wesmael, females can be distinguished best by characters (1), (2), and (4).

Chromatically *Colpognathus* agrees with *Phaeogenes*. In the Palearctic type species the apical tergites are black, in the Nearctic species the abdomen is uniformly red. There is a marked sexual dichromatism in the basic color of head and thorax in the Nearctic species, the orange ferruginous being replaced by black in the male.

DISTRIBUTION: Holarctic Region.

1. *Colpognathus helvus* (Cresson) Map 148

Ichneumon helvus Cresson, 1867:312, female.

Ichneumon fungor Cresson, 1867:306, male.

Cryptus certus Provancher, 1874:177, 200, male.

Phygadeuon hilaris Provancher, 1874:284, female.

Cryptus ruficornis Provancher, 1879:139, male.

Colpognathus helvus, Townes, 1944:308, female (quotations, hosts). Townes and Townes, 1951:279, (synonymy, distribution, hosts).



Map 148. *Colpognathus helvus* (Cresson)

Holotypes: *Ichneumon helvus*, female, Pennsylvania; ANS. *Ichneumon fungor*, male, New York; ANS. *Cryptus ruficornis*, male, Quebec; *Cryptus certus*, male, Quebec; *Phygadeuon hilaris*, female, Quebec; above 3 types, Provincial Museum Quebec.

FEMALE: (southeastern specimens). Length 10 mm. Nearly uniformly ferruginous orange; only the following black: extreme base and median suture of prosternum, base of prepectus, mesolcus narrowly, apical surface of mesosternum, axillary troughs, basal furrow of propodeum narrowly, lateral margin and apical margin of propodeum very narrowly, and lateral margin of mesoscutum behind tegulae; mandibles more or less infuscated; flagellum dark ferruginous, blackish infuscated toward apex from about the 11th segment on.

FLAGELLUM: Filiform, short, and stout, with 23-(usually) 24 segments, the 1st 1.5

times as long as apically wide, the 2nd about 2 times as long as apically wide, the 8th square.

HEAD: Temple profile not narrowed behind eyes, distinctly curved; frons below lower ocellus slightly concave; antennal cavities indicated, finely, transversely rugose; rest of head coarsely and densely punctured; cheeks in lateral view very wide, convex; malar space abbreviated, less than $1/2$ as long as width of mandible base; carina genalis strongly curved inward before meeting the carina oralis, the junction of the 2 carinae situated far behind the lower corner of mandible base; mandibles behind subbasal constriction strongly widened into a broad, convex shovel, terminated by 2 short, subequal, apical teeth.

THORAX: Mesoscutum medially nearly as wide as long; notauli barely indicated at the extreme base; area posteromedia longer than the horizontal part of propodeum, with subobsolete lateral carinae; area superomedia only slightly longer than wide, hexagonal, with costulae near the anterior end.

LEGS: Moderately slender; coxae III ventrally densely and fairly finely rugose punctate, without projections.

ABDOMEN: Postpetiole without distinct median field, very finely, irregularly, longitudinally rugose; 2nd tergite basally usually with extremely fine, short, longitudinal rugosity; gastrocoeli and thyridia obsolete; tergites 2-4 alutaceous, with very fine, scattered punctures; posterior tergites glossy and almost smooth; ovipositor hidden, apex of abdomen semi-amblypygous.

MALE: Length 9-10 mm. Head and thorax, in contrast to female, black, only mandibles (except teeth) and tegulae ivory white and the clypeus orange ferruginous, the latter varying to predominantly black (except ferruginous apical margin); scutellum sometimes ferruginous marked; entire abdomen and the legs, including all coxae and trochanters orange ferruginous, the extreme tip of femora III and of tibiae III, and the tarsi III slightly infuscated; flagellum orange ferruginous, a shade darker on dorsal side than on the ventral side, without white annulus; apex of scape and the postannellus infuscated on dorsal side.

Flagellum with 27 segments, without clearly recognizable tyloids. Otherwise the male shares with the female the sculpture of anterior tergites, the lack of lateral carinae of area posteromedia, and the lack of gastro-

coeli and thyridia. The most striking characters of the female, however, particularly the structure of mandibles, combined with the dislocation of the carinal junction, are barely indicated in the male.

DISTRIBUTION (map 148): Transcontinental in Transition and Upper Austral Zones (Townes and Townes, 1951). ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 12-17-V-1972, G. Heinrich, D. Shaneck. GEORGIA. Banks Co.: 1 male, Homer, 13-V-1970, G. Heinrich. Monroe Co.: 1 male, Forsyth, 8-18-VII-1970, F. Naumann. LOUISIANA. Webster Co.: 1 female, Bisteneau State Park, 21-IV-4-V-1972, G. Heinrich, D. Shaneck. MISSISSIPPI. Oktibbeha Co.: 2 females, Starkville, 1-6-IX-1970 and 21-29-V-1971, C. Sartor. NORTH CAROLINA. Wake Co.: 1 male, Raleigh, 10-VI-1951, G. Heinrich. All specimens in CGH II.

HOSTS: *Platyptilia carduidactyla* (Riley) (Pterophoridae) in California (Townes, 1944).

48. Genus *Centeterus* Wesmael

Centeterus Wesmael, 1844:166, 176. Townes, 1944:306 (5 Nearctic species). Townes and Townes, 1951:278-279 (4 Nearctic species). Perkins, 1959-1960:95-96 (2 species from England). Townes, et al., 1965:421 (3 eastern Palearctic species, 1 with question mark).

Type species: *Centeterus major* Wesmael; designated by Ashmead, 1900.

SYSTEMATICS: Females of this genus share with *Colpognathus* Wesmael the absence of gastrocoeli and thyridia. The mandibles are also fairly wide, but not at all constricted behind base and approximately parallel sided; a 2nd character differentiating this genus from the closely related *Colpognathus* is offered by the apex of the female abdomen which is not semi-amblypygous, but clearly oxypygous, with the ovipositor somewhat projecting (cf. figures in Perkins, 1959-1960).

The 2 middle-European species (including the type species, *C. major*) are coarsely punctured (densely on head and thorax, less densely on anterior tergites) and smooth between punctures; the Nearctic species, recorded below, has a quite different sculpture and differs also by a laterally distinctly, though finely, carinate scutellum. It is not a typical representative of the genus.

DISTRIBUTION: Holarctic Region.



Map 149. *Centeterus tuberculifrons* (Provancher)

1. *Centeterus tuberculifrons* (Provancher) Map 149

Phygadeuon tuberculifrons Provancher, 1874:284, female.

Phygadeuon fasciatus Provancher, 1886:55, female.

Centeterus tuberculifrons, Townes, 1944:307, female (quotations). Townes and Townes, 1951:279 (synonymy, distribution).

Holotypes: *Phygadeuon tuberculifrons*, female; Quebec, and *Phygadeuon fasciatus*, female; both types in Provincial Museum Quebec. Neallotype: male, Forsyth, Georgia, 1-10-VII-1971. CGH II.

SYSTEMATICS: The female, recorded below, has been identified by H. Townes; the species differs rather strongly from the European type species *C. major*, by the fine, alutaceous sculpture of thorax and anterior tergites, and by the presence of lateral carinae on the scutellum. Advanced knowledge of this group may perhaps lead to a subdivision of the genus.

FEMALE: (description based on specimen from Georgia). Length 6 mm. Almost uniformly orange ferruginous, only axillary troughs and median part of basal furrow of propodeum partially infuscated; flagellum ferruginous, with dorsal, white annulus on segments 8-10, black beyond annulus, segments before annulus dorsally slightly infuscated; scape ferruginous.

FLAGELLUM: Filiform, with 21 segments, the 1st only very slightly longer than apically wide and somewhat shorter than the 2nd, in lateral view the 8th about square.

HEAD: Temple profile not narrowed behind eyes, strongly curved; temple region and occipital region convex, gradually curved down to carina occipitalis; cheek profile only slightly narrowed toward mandible base, with almost straight outline; malar space about 1/2 as long as width of mandible base; cheeks in lateral view very wide and strongly convex; median field of face distinctly, lateral fields slightly protruding; carinal junction situated behind lower corner of mandible base in a distance from the latter approximately equal to the length of malar space; mandibles broad, with the upper, apical tooth slightly longer than the lower; frons and face very finely coriaceous, with dense, extremely fine puncturation, subopaque; clypeus and cheeks likewise coriaceous but with sparse, extremely fine puncturation.

THORAX: Mesoscutum medially nearly as wide as long, slightly convex, very densely and extremely finely punctured, with fine, coriaceous undersculpture, subopaque; base of notauli recognizable; scutellum slightly raised above postscutellum, with distinct, though fine, lateral carinae; horizontal part of propodeum and declivity of nearly equal length; propodeum with complete carination, the horizontal part finely, irregularly rugose and coriaceous; area superomedia more than twice as long as wide, with costulae far before middle, strongly narrowed from costulae toward base; sternauli on the mesosternum distinct.

LEGS: Fairly slender; coxae III ventrally densely punctured and coriaceous, without projections.

ABDOMEN: Fairly slender, the 2nd tergite medially longer than apically wide; postpetiole and tergites 2 and 3 very finely and evenly coriaceous, subopaque; no trace of gastrocoeli and thyridia.

MALE: Length 8-9 mm. Head and thorax black, with restricted orange-ferruginous markings; abdomen and legs, including coxae, orange ferruginous; clypeus pale orange; sometimes the following orange ferruginous: mark on collare, lower part of pronotal base, apex of pronotal ridge, subalarum, and apex of scutellum; mandibles and tegulae yellowish; coxae III ventrally, at base or more extensively, black; apices of tibiae III and the tarsi III moderately infuscated; flagellum including scape,

ventrally pale ochreous, dorsally blackish brown, without annulus.

Flagellum with 26-28 segments; tyloids not recognizable. Malar space distinctly shorter than width of mandible base; dense, alutaceous-subopaque sculpture extending over the 4th tergite and gradually becoming finer and more glossy on the following tergites. Otherwise corresponding with the female.

DISTRIBUTION (map 149): Quebec south to Georgia. GEORGIA. Monroe Co.: Forsyth, 1 female, 1-8-X-1970, 2 males, 25-VI-10-VII-1971, F. Naumann (CGH II).

49. Genus *Diadromus* Wesmael

Diadromus Wesmael, 1844:166, 207, 221. Townes, 1944:304 (4 Nearctic species). Townes and Townes, 1951:278 (4 Nearctic species). Perkins, 1959-1960:77, 90-95 (7 species from England). Townes, et al., 1965:419-420 (*Thyraella* Holmgren as synonym; 3 eastern Palearctic species).

Type species: *Ichneumon troglodytes* Graenicher; designated by Ashmead, 1900.

SYSTEMATICS: The genus shares with *Phaeogenes* Wesmael the transverse, markedly deepened gastrocoeli, with narrow (sometimes even subobsolete) interspace and also the general structure of thorax and abdomen. Distinguishing characters from *Phaeogenes* are: (1) absence of a separating, transverse depression between the median field of face and the clypeus; (2) a depression of the apical section of the clypeus as described in detail by Perkins (1959-1960:77). The character (1) is poorly developed in the type species of *Diadromus*; Perkins (1959-1960) has discussed the difficulties to draw a clear borderline between the 2 genera on the base of this distinction; he considers the clypeal character as the decisive 1 for their separation. It appears doubtful to me whether the generic separation of *Phaeogenes* and *Diadromus* should be maintained. I do not agree, however, with the synonymization of *Thyraella* Holmgren with either *Phaeogenes* or *Diadromus* as the structure of gastrocoeli is in *Thyraella* basically different from the type species of both genera.

In the species recorded below from Arkansas the fusion of clypeus and face is perfectly developed, but the apical margin of the clypeus does not show the structure described by Perkins as typical for the genus; the gastrocoeli are superficial, and the thyridia are somewhat removed from the base of 2nd tergite, a structure corresponding more with *Thyraella* than with the type species of *Diadromus*.

DISTRIBUTION: Holarctic region.

1. *Diadromus helvolus* (Cresson)
Map 150

Ichneumon helvolus Cresson, 1867:312, female.

Ichneumon magdalensis Provancher, 1890: 248, male.

Diadromus helvolus, Townes, 1944:304, female, male (synonymy, quotations). Townes and Townes, 1951:278 (distribution, synonymy).

Holotypes: *Ichneumon helvolus*, female, Illinois; ANS. *Ichneumon magdalensis*, male, Magdalen Is., Quebec; Provincial Museum Quebec.

SYSTEMATICS: The female recorded below has been identified by H. Townes. It is distinguished by narrow, elongate shape of the abdomen, finely coriaceous, opaque sculpture of most of the body, by the absence of a separating, transverse depression between clypeus and face, and by an elevated carina on the ventral side of coxae III.

FEMALE: (specimen from Arkansas). Length 8 mm. Uniformly orange ferruginous, without black or white markings; flagellum with white annulus on segments 8-10, blackish beyond annulus.

FLAGELLUM: Subfiliform, slender, slightly attenuated toward apex, with 23 segments, the 1st slightly more than twice as long as apically wide and distinctly shorter than the 2nd, in lateral view the 14th approximately square.

HEAD: Temple profile not narrowed behind eyes, with strongly curved outline; vertical region slanting down from ocellar region to occipital carina in a gradual curve; face strongly convex from eye to eye, the median field not separated from the lateral fields by longitudinal depressions nor from the clypeus by a transverse depression; malar space slightly shorter than the width of mandible base; carinal junction very close to lower corner of mandible base, the carina oralis not raised; mandibles fairly broad, the upper tooth somewhat longer than the lower; apical margin of clypeus without median tubercles or impression; entire head finely and densely coriaceous and subopaque, with scattered, extremely fine, microscopic punctures.

THORAX: Mesoscutum medially about as long as wide, with very fine, coriaceous sculpture, subopaque; sculpture of propodeum slightly coarser coriaceous, opaque,

the carination indistinct but complete; horizontal part of propodeum medially slightly longer than area posteromedia; the area superomedia coffin shaped, much longer than wide; mesopleura finely coriaceous, opaque, with sparse, very fine punctation, the speculum glossy; mesosternum likewise sculptured, with the sternauli subobsolete.

LEGS: Moderately slender, the coxae III ventrally finely and densely punctured, with an oblique, medially strongly elevated carina before apex, the carina extending from ventral side of coxa onto interior side and there to the apex of coxa.

ABDOMEN: Moderately narrow, elongate, the 2nd tergite distinctly longer than apically wide; gastrocoeli superficial, thyridia fairly distinct, somewhat removed from the base of 2nd tergite and slightly oblique, each somewhat wider than their interspace; all tergites with very fine and dense, coriaceous sculpture, tergites 1-4 subopaque, the following tergites slightly glossy.



Map 150. *Diadromus helvolus* (Cresson)

DISTRIBUTION (map 150): Atlantic to Saskatchewan and Iowa in Transition and Upper Austral Zones (Townes and Townes, 1951). ARKANSAS. Garland Co.: 1 female, Ouachita State Park, 15-18-V-1972, G. Heinrich, D. Shaneck (CGH II).

50. Genus *Dicaelotus* Wesmael

Dicaelotus Wesmael, 1844:156, 175. Townes, 1944:308-310 (new synonymy; 8 Nearctic species). Townes and Townes, 1951:279 (*Chauviniella* Heinrich as synonym; 7 Nearctic species). Perkins, 1959-1960:72, 83-87 (*Deloglyptus* Foerster as synonym and section of *Dicaelotus*; figures). Townes, et al., 1965:422-423 (*Deloglyptus* Foerster and *Euryptilus* Holmgren as synonyms but not *Chauviniella* Heinrich¹; 5 eastern Palearctic species).

Type species: *Ichneumon pumilus* Gravenhorst.

Leptodemus Foerster, 1868:182.

Type species: *Leptodemus cariniscutis* Cameron

Deloglyptus Foerster, 1868:193.

Type species: *Deloglyptus punctiventris* Thomson.

Cinxaelotus Holmgren, 1889:367.

Type species: *Cinxaelotus erythrogaster* Holmgren.

Euryptilus Holmgren, 1889:375.

Type species: *Euryptilus kriechebaumeri* Holmgren.

SYSTEMATICS: I have not done basic taxonomic research on this genus; the synonymy given above represents an uncritical quotation of the present status.

The genus *Dicaelotus* is distinguished by the combination of the following characters: (1) complete absence of gastrocoeli and thyridia; (2) abbreviated propodeum, with the horizontal part medially shorter than the declivity, the area superomedia usually a little wider than long, approximately heart shaped, pentagonal or hexagonal, with the costulae behind middle (in the *Deloglyptus* group as long as, or longer than wide, with the costulae before middle); (3) mandibles with straight lateral borders, only slightly tapering toward apex, the upper tooth slightly longer than the lower (in the *Deloglyptus* group the lower tooth much shorter than the pointed upper tooth); (4) the basic sculpture of abdomen usually smooth and glossy, with puncturation of anterior tergites varying specifically in density and coarseness to exceptionally nearly complete absence of puncturation; (5) coxae III without projections.

A comparatively clearly defined genus, with numerous species, all of nearly equally small size, varying from 4-6 mm length.

In females head and thorax are black, with

rare exceptions without white markings, but often with ferruginous-orange parts; abdomen and legs vary specifically from orange ferruginous or brown to black (or displaying both colors in combination), without white markings. The association of sexes remains a largely unsolved problem.

DISTRIBUTION: Holarctic Zone.

Key to species of *Dicaelotus* Wesmael from the southeastern states

Females

1. Sculpture of tergites 2-4 opaque, very densely and finely coriaceous rugose, with extremely fine puncturation. (Tergites 2-4 red, the 1st and the last 3 tergites black; length 5-6 mm). 2
- Sculpture of tergites 2-4 smooth and glossy, with or without distinct puncturation. 3
2. Gastrocoeli and thyridia obsolete, indicated at the most by punctiform, shallow depressions in the exterior, basal corners of the 2nd tergite; flagellum ferruginous, without white annulus and apically not black. (Area superomedia distinctly longer than wide). 4. *coriaceus*, new species
- Gastrocoeli and thyridia recognizable and wider than long; flagellum with white annulus, apically black. see *Phaeogenes parvus* (Provancher)
3. Tergites polished, without puncturation. (First tergite always predominantly black; tergites 2 and 3 usually with extensive blackish infuscations, rarely uniformly orange; tergites 4-5 or 6 usually predominantly black; length 5-6 mm). 1. *clypeatus* (Cresson)
- Tergites 2-4 with distinct (fine to fairly coarse) puncturation. 4
4. Tergites 2-7 uniformly orange, the 1st tergite medially black, basally and apically orange; puncturation of tergites 2-4 sparse and rather fine. 3. *auranticolor*, new species
- Tergites 2-5 with extensive black pattern, the 1st tergite black, with only apical margin orange; puncturation on

¹*Chauviniella* Heinrich appeared in Townes (1973:220) as synonym of *Chauvinia* Heinrich from Madagascar. I disagree.

on ventral side, scape ivory, except infuscated mark on exterior side.

Otherwise differs from female in structure and sculpture by markedly shorter malar space and shorter area superomedia, and by distinct puncturation on tergites 2-7.

DISTRIBUTION (map 151): Maine, Rhode Island, New York, New Jersey, North Carolina, Illinois; Transition and Upper Austral Zones (Townes and Townes, 1951). GEORGIA. Neel Gap, 1 male, 1 female, IV and VI (UGA). Also, Blue Ridge (VI), Clayton (V), and Hiawassee (VI) (reported by Fattig, 1950). TENNESSEE. Henderson Co.: 3 females, Natchez Trail State Park, 12-26-VI-1972, G. Heinrich, D. Shaneck (CGH II).

2. *Dicaelotus attenuatus* (Provancher)

Map 152

Phygadeuon attenuatus Provancher, 1882: 334, 359, female.

Phaeogenes sectus Provancher, 1888:358, male.

Herpestomus flavicoxae Harrington, 1894: 210, male.

Phygadeuon (*Plesignathus*) *taeniatum* Viereck, 1917:335, 336, male.

Dicaelotus attenuatus, Townes, 1944:309, female (quotations). Townes and Townes, 1951:279, female, male (synonymy; distribution).



Map 152. *Dicaelotus attenuatus* (Provancher)

Holotypes: *Phygadeuon attenuatus*, female, Quebec, and *Phaeogenes sectus*, male, Quebec; both types, Provincial Museum Quebec.

SYSTEMATICS: The female, recorded below, was identified by H. Townes. The specimen is identical in color with some specimens of *clypeatus* (Cresson) (described above) and agrees with that species in general structure; it differs from *clypeatus* only by (1) a distinct, though moderately fine, fairly dense puncturation on tergites 2 and 3 (and finer and more sparse puncturation also on the following tergites), (2) a heart-shaped, distinctly wider than long area superomedia, and (3) a greater number of flagellar segments.

FEMALE: (specimen from Tennessee). Length 6 mm. Head and thorax black, with orange mandibles (except teeth), clypeus, and mark on collar; the extreme apex of pronotal ridge, tegulae, and narrow line on subalarum ivory; abdomen orange ferruginous with the following black parts: 1st tergite (except narrowly orange apical margin), large, ill-defined, bipartite median mark on the 2nd tergite and on the 3rd tergite, the 4th tergite and the 5th predominantly (except apically and laterally); legs orange ferruginous, all trochanters and coxae I and II yellow tinged orange; flagellum without annulus; scape and segments 1-10 ferruginous, the following segments blackish.

FLAGELLUM: Short, filiform, with 25 segments, the 1st nearly 1.5 times as long as apically wide and distinctly shorter than the 2nd, in dorsal view the 6th square.

DISTRIBUTION (map 152): Atlantic to Continental Divide in Transition and Upper Austral Zones (Townes and Townes, 1951). TENNESSEE. Henderson Co.: 1 female, Natchez Trail State Park, 10-15-V-1972, G. Heinrich, D. Shaneck (CGH II).

3. *Dicaelotus auranticolor*, new species

Map 153

SYSTEMATICS: The holotype has been examined by H. Townes who could not identify the species; it is in structure and sculpture very closely related to *clypeatus* (Cresson), but differs from that species rather strongly in color and also slightly in sculpture of tergites 2-4; the tergites 2-4 are not completely smooth but clearly, though fairly sparsely and finely, punctured, the puncturation being noticeably finer than in *attenuatus* (Provancher). A subspecific association with *clypeatus* seems possible.



Map 153. *Dicaelotus auranticolor*, n. sp.

FEMALE: Length 5 mm. Head and thorax black, the following orange: mandibles (except teeth), clypeus, malar space with apex of cheeks indistinctly, broad mark on inner orbits (level with antennal sockets), collare with entire pronotal base; extreme apex of pronotal ridge, tegulae, and mark on subalarum orange tinged yellow; legs light orange, all trochanters, coxae I and II, and femora and tibiae I yellow tinged; abdomen almost uniformly orange, only the 1st tergite from beyond base to about middle of postpetiole black; flagellum without white annulus, scape and segments 1-11 orange, the remaining segments blackish.

FLAGELLUM: Filiform, with 23 segments, the 1st about 1.5 times as long as apically wide and clearly shorter than the 2nd, in dorsal view the 8th approximately square.

HEAD, THORAX, and LEGS: Structure and sculpture as described for *clypeatus*; the area superomedia hexagonal and only slightly longer than wide.

ABDOMEN: Postpetiole longitudinally rugose laterally, medially nearly smooth toward apex; tergites 2-7 polished, 2 and 3 with well recognizable, fine, and fairly sparse puncturation; on the 4th tergite a sparse and extremely fine puncturation also recognizable (at 60 times magnification).

Holotype: female, Arkansas, Garland Co.,

Ouachita State Park, 18-23-V-1972, G. Heinrich, D. Shaneck (CGH II).

DISTRIBUTION (map 153): Known only from the type locality.

4. *Dicaelotus coriaceus*, new species

Map 154

SYSTEMATICS: The type specimen has been examined by H. Townes, who could not identify the species and was in doubt about its generic position.

These 2 females differ from typical *Dicaelotus* specimens by the following 3 characters: (1) sculpture of tergites 2-4 densely coriaceous, opaque, with very fine and dense puncturation; (2) the subapical mandible tooth very small, much shorter than the pointed upper tooth; (3) area superomedia markedly longer than wide. The 2 females agree with the diagnosis of *Dicaelotus* in every other regard, particularly in the decisive absence of gastrocoeli and thyridia; characters (2) and (3) agree with the *Deloglyptus* section of *Dicaelotus* as interpreted by Perkins (1959-1960); this leaves only the opaque sculpture of the anterior tergites as a possible distinction from *Dicaelotus*; as sculptural differences of this kind have been included so far in the genera *Phaeogenes* Wesmael and *Diadromus* Wesmael, I am attributing this species tentatively to the genus *Dicaelotus*.



Map 154. *Dicaelotus coriaceus*, n. sp.

The species has a startling similarity in size, color, and structure with the sympatric *Phaeogenes parvus* (Provancher); it can be distinguished from the latter by the complete lack of gastrocoeli and thyridia, by the relatively shorter basal segments of the flagellum, and by lack of a white flagellar annulus.

FEMALE: Length 6 mm. Head and thorax black, with orange mandibles (except teeth), clypeus, mark on collare, and in 1 specimen also sides of median field of face, extreme apex of pronotal ridge, and tegulae; legs uniformly ferruginous red, including coxae and trochanters, coxae III basally more or less extensively blackish infuscated; abdomen black, tergites 2-4 red; flagellum uniformly ferruginous, including scape, without annulus.

FLAGELLUM: Short, filiform, with 20-21 segments, the 1st 1.5 times as long as apically wide and slightly shorter than the 2nd, in dorsal view the 9th square.

HEAD: Temple profile slightly narrowed behind eyes, curved; cheek profile in front view distinctly narrowed toward mandible base, barely curved; malar space somewhat shorter than width of mandible base; carinal junction in a very short distance from lower corner of mandible, the carina oralis slightly raised; the lower mandible tooth rather small and differentiated only by a small notch from the markedly longer, upper tooth; face and frons very densely and fine rugose punctate, cheeks sparsely and finely punctured, glossy between punctures.

THORAX: Mesoscutum and scutellum densely and finely punctured, the latter laterally not carinate; horizontal part of propodeum medially slightly longer than area postero-media; area superomedia distinctly longer than wide, pentagonal, with the costulae before middle, narrowed from costulae toward basal furrow almost into a point, parallel sided behind costulae; entire propodeum densely and irregularly rugose punctate; sternauli on the mesosternum pronounced.

LEGS: Moderately stout; coxae III ventrally densely punctured.

ABDOMEN: Postpetiole laterally irregularly mainly longitudinally rugose, most of the median field finely coriaceous rugose; tergites 2-4 very finely and densely coriaceous rugose, with extremely fine, microscopic, moderately dense punctation, the 2nd and 3rd tergite opaque, the 4th subopaque; the following tergites with some,

extremely fine coriaceous sculpture and somewhat glossy, covered with short, sparse, whitish pilosity; there is an indication of very small, punctiform impressions (gastrocoeli) in the basal, exterior corners of the 2nd tergite.

Holotype: female, Tennessee, Henderson Co., Natchez Trail State Park, 22-26-VI-1972, G. Heinrich, D. Shaneck (CGH II). **PARATYPE:** 1 female, same data, except 13-23-VI-1972 (CHT).

DISTRIBUTION (map 154): Known only from the type locality.

51. Genus *Terebraella* Heinrich

Fig. 73

Terebraella Heinrich, 1972:211.

Type species: *Terebraella culiciops* Heinrich; original designation.

SYSTEMATICS: The genus is particularly distinguished by the plainly projecting ovipositor, long malar space, slender body and flagellum, obsolete gastrocoeli, and densely coriaceous, subopaque sculpture of head and body. The type species is a small, very slender, and nearly uniformly pale, ochreous orange. Females somewhat resemble the genus *Heterischnus* Wesmael (= *Rhexidermus* Foerster) by their slender appearance and especially in structure of their long and extremely slender flagellum with very elongate basal segments, but differ

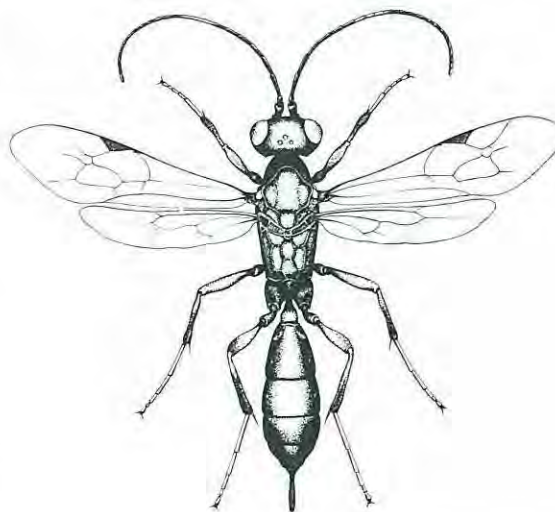


Fig. 73. *Terebraella culiciops* Heinrich (female). Dorsal view.

from that genus clearly by normal structure of mandibles, much more projecting ovipositor, subobsolete gastrocoeli and thyridia, and in wing venation by the abbreviated radial cell. The genus *Thyraella* may still be closer related; it differs by the not-considerably-projecting ovipositor, by structure of head (with wide, bulging temple profile and much shorter malar space), and by coarse puncturation of face and frons (in contrast to finely coriaceous in *Terebraella*).

MORPHOLOGICAL CHARACTERS

FLAGELLUM: Of females fairly long, bristle shaped, extremely slender, not at all widened beyond middle, the 1st segment strongly elongate, about 6 times as long as wide, all segments markedly longer than wide; of males likewise slender, with likewise elongate basal segments, all segments longer than wide, cylindrical, not at all nodose, covered by short pilosity, with a short row of bacilliform, fairly-distinct tyloids beginning on about the 9th segment.

HEAD: Temple profile distinctly narrowed behind eyes and only slightly curved; malar space unusually long, considerably longer than width of mandible base; mandibles normal, with fairly long, pointed, apical tooth and short, subapical tooth; cheek profile in front view distinctly narrowed toward mandible base, almost straight; clypeus distinctly convex transversely, only slightly convex from base to apex, with broadly-curved, apical border, separated from the face by a distinct, though narrow and only slightly-impressed, transverse furrow; face evenly convex from eye to eye, the median field barely indicated; frons slightly and evenly convex, the antennal cavities obsolete; cheeks in lateral view fairly wide, convex; temples and vertex gradually sloping downward from eyes and ocelli to carina occipitalis; carina genalis and carina oralis meeting before mandible base in a distance about equal to the width of mandible base; sculpture of entire head finely and densely coriaceous, subopaque.

THORAX: Notauli barely indicated at the extreme base; sternauli on the mesosternum pronounced; mesoscutum only slightly longer than medially wide, moderately convex; scutellum distinctly raised above postscutellum and dorsally convex, laterally carinate at extreme base only; propodeum of the clearly-broken type, with very small, circular spiracles; carination almost complete, only lateral carinae of area posteromedia somewhat indistinct; basal furrow distinct and complete; horizontal part

medially only slightly shorter than area posteromedia, the area superomedia coffin shaped, much longer than wide, with costulae far before middle; areae dentiparae nearly parallel sided, narrow, unusually elongate, their exterior carinae more than twice as long as median width of areae, their apices slightly projecting.

LEGS: Fairly long and slender; coxa III of females very finely and very densely coriaceous, without trace of teeth or projections.

WINGS: Nervulus interstitial or slightly postfurcal; areolet pentagonal, intercubiti widely separated in front, the 2nd intercubitus sometimes indistinct; radial cell abbreviated, distinctly shorter than in *Heterischnus*, the radius very short (as in *Thyraella*), almost straight.

ABDOMEN: Slender, 2nd tergite distinctly longer than apically wide in both sexes; postpetiole only slightly wider than petiole, densely coriaceous, subopaque, the median field barely indicated; ovipositor strongly projecting, slightly longer than tergites 6 and 7 together; gastrocoeli obsolete, thyridia fairly distinct, narrower than their distance from base of 2nd tergite.

DISTRIBUTION: Florida.



Map 155. *Terebraella culiciops* Heinrich

Terebraella culiciops Heinrich
Fig. 73, Map 155

Terebraella culiciops Heinrich, 1972:211, female, male.

Holotype: female, Florida; CGH II. Allotype: male, Florida; CGH II.

FEMALE: Length 6 mm. Pale ochreous orange, without white markings; apex of femora III, the tibiae III, tarsi III, and usually tergites 5 or 6-7 slightly infuscated; flagellum black, with complete, white annulus on segments 7-10 or 11 (base); scape ochreous orange; the 1st segment, and (less distinctly) the 2nd, ferruginous tinged.

FLAGELLUM: With 22 segments; bristle shaped, very slender, the 1st segment about 6 times as long as wide, all segments distinctly longer than wide.

MALE: Length 4-6 mm. Ventral side of thorax with oxae and trochanters somewhat paler than in female; flagellum black, without annulus, the scape and 1st segment (the latter at least ventrally) ochreous orange, the following segments more or less distinctly brownish on ventral side.

FLAGELLUM: With 22 segments and with moderately distinct, broadly-bacilliform tyloids on segments 9-12.

DISTRIBUTION (map 155): Known only from Florida as follows: Alachua Co.: 1 female, Gainesville, 2-V-1968, G. Heinrich. Highlands Co.: 2 females, 4 males, Archbold Biological Station (Lake Placid), 21-24-VI-1967, G. Heinrich; 2 females, Highlands Hammock State Park, 29-IX-30-XI-1969, R. W. Moran. All specimens in CGH II.

ECOLOGY: The type species was found in dense growth of ferns in a black gum swamp.

ADDENDA

I. The Fattig List

In 1950 P. W. Fattig published in the Emory University Museum Bulletin No. 9, under the title "The Ichneumonidae or Parasitic Hymenoptera of Georgia" a list (referred to in this publication simply as "the Fattig list") of species recorded from the State of Georgia. It contains under No. 210-333 the names (or in many cases only generic names) of 123 forms belonging to the subfamily Ichneumoninae.

The list reveals neither the sex of the recorded specimens nor the name of the person who made their identification. At the time of its publication the knowledge of the Nearctic fauna of the Ichneumoninae was still very incomplete, and the association of sexes for a considerable number of species was not known or was incorrect; consequently, the names published in the list cannot be regarded as authentic and therefore could not be incorporated into this publication without thorough examination of all identifications it contains.

By courtesy of Emory University, the Ichneumoninae of the University Museum have been forwarded to me. A check of the material showed that the Fattig specimens, upon which the Georgia records in the Fattig list are based, were not kept together as a unit, but mixed with many specimens from other states of the U.S.A. Only a small fraction of the records published by Fattig was found to be covered by specimens with identical data on the locality labels. One of these few records was that of the species *Cratichneumon duplicatus* Say; 6 specimens from Georgia are in the collection, 5 provided with an individual identification label by Fattig, 1 by Cushman; none of these specimens belongs to the species *duplicatus* Say; they belong to 5 different *Cratichneumon* species instead and 1 *Melanichneumon* species (see No. 35 of the following discussion).

Considering all circumstances mentioned above, I cannot avoid the conclusion that (a) the scientific value of the Fattig list (at least as far as the subfamily Ichneumoninae is concerned) must be considered as very low, and that (b) the records published in it cannot be incorporated "at face value" into this publication.

The following list represents a selection of all those species names from the Fattig list which are not recorded already from the southeastern region in this publication and which therefore represent or could perhaps represent additional records for the southeast. A note is added to every species whether or not a specimen recorded by Fattig was found in the collection. Critical remarks are added to many records to explain the degree of probability of the correctness of Fattig's identification. The overwhelming majority of confirmed, additional species records refers to species of the Appalachian fauna, reaching on the most southern spurs of the Appalachian Mountains into the northwestern corner of Georgia (and northeastern

corner of Alabama). Zoogeographically, this fauna does not belong to the Austroriparian zone, and therefore does not come into the scope of this publication.

1. *Coelichneumon pepticus* Cresson (*Ichneumon pepticus* Fattig)

Georgia: "Clayton, Neel Gap, August; Rabun Bald, Tray Mountain, September." No specimen.

This species is known so far only from the West, and in the East from Illinois and New Jersey; it is rather similar to *orpheus* Cresson. The record is considered questionable.

2. *Stenichneumon culinator cincticornis* Cresson (*Aoplus cincticornis* Fattig)

Georgia: Blue Ridge, Bufford, June; Neel Gap, May, September; Tiger, August. 1 female, Neel Gap, May, in Coll. Fattig; correct identification.

This record is confirmed by 1 female, Vogel State Park, hibernating, 9-I-1972, leg. R. Duffield.

3. *Patrocloides montanus* Cresson (*Patroclus montanus* Fattig)

Georgia: Rabun Bald, July.

This specimen has not been located; there is, however, a male in the collection from Blood Mt., 6-VII, with correct identification.

4. *Ichneumon saucius* Cresson (*Chasmias saucius* Fattig)

Georgia: Athens, Blairsville, July; Clayton, June; Young, Harris, July. No specimen.

This species has not been found south of North Carolina. It would seem possible that the species *scelestus* Cresson, which is rather common in Florida, has been mistaken for *saucius*.

5. *Exephanes subfulvus* (Cresson)

Georgia: Cornelia, April; Ringgold, May; Tallulah Falls, April. No specimen.

This is a western species, recorded from Alberta, Saskatchewan, and Colorado. Its occurrence in Georgia is unlikely. The record, not confirmed by a specimen, must be ignored.

6. *Ichneumon bimembris* Provancher (*Pterocormus bimembris* Fattig)

Georgia: Blue Ridge, June; Calhoun, Clarkesville, May; Dillard, June. No specimen.

This species is difficult to distinguish from *caliginosus* Cresson. Without the examination of the recorded specimens the record is questionable.

7. *Ichneumon centrator* Say (*Pterocormus centrator* Fattig)

Georgia: Blairsville, Cornelia, July; Dahlonega, June. No specimen.

8. *Ichneumon devinctor* Say (*Pterocormus devinctor* Fattig)

Georgia: Atlanta, Gainesville, June; Neel Gap, Ringgold, Tiger, July. No specimen.

The record of this species has been confirmed recently by 1 female from Bartow Co., 15-I-1972, hibernating, leg. R. Duffield.

9. *Ichneumon feralis* Cresson (*Pterocormus feralis* Fattig)

Georgia: Blairsville, Dalton, June; Tallulah Falls, May. No specimen.

This species' name applied originally to a complex of 3 species which were not separated until 1961 (Heinrich, Synopsis of Nearctic Ichneumoninae Stenopneusticae). *Ichneumon feralis* Cresson, as represented by the type specimen, is a northeastern form, and its occurrence in Georgia is unlikely. The record may refer to *Ichneumon feriens* Heinrich, but without the specimen representing it, it cannot be confirmed.

10. *Ichneumon maius* Cresson (*Pterocormus maius* Fattig); "*Amblyteles versabilis* Cresson is a synonym".

Georgia: Blue Ridge, August; Clayton, Neel Gap, July. No specimen.

A. versabilis Cresson is not a synonym but a distinct species which is treated in this publication and also recorded from Georgia. In all probability it is the species *versabilis* to which Fattig's records refer. The record of *maius* Cresson should be ignored.

11. *Ichneumon annulatorius* Fabricius (*Pterocormus funestus* Fattig)

Georgia: Cartersville, May; Cleveland, July; Neel Gap, Rome, Tallulah Falls, June. No specimen.

Without confirmative examination of the specimens recorded, the record remains questionable.

12. *Ichneumon inurbanus* Cresson (*Pterocormus inurbanus* Fattig)

Georgia: Rome, May; Toccoa, June. No specimen.

This is a complex of about 6 likewise colored and extremely similar species which can be distinguished only by examination of mandibular and flagellar characters. Without the recorded specimen the records are worthless.

13. *Ichneumon placidus* Provancher (*Pterocormus placidus* Fattig)

Georgia: Brasstown Bald (Enotah Bald), June. No specimen.

The remark added to the preceding species also applies here.

14. *Ichneumon longulus* Cresson (*Pterocormus longulus* Fattig)

Georgia: Clarkesville, May; Young Harris, June. No specimen.

The species described and known only from Colorado. The record is most unlikely, and, as not covered by a specimen, must be ignored.

15. *Ichneumon parvus* Cresson (*Pterocormus parvus* Fattig)

Georgia: Blood Mountain, June; Rabun Bald, Ringgold, August; Tallulah Falls, May. No specimen.

This is a dubious species, based on a male from Illinois and recorded another time only from Montana. The records from Georgia probably are incorrect.

16. *Ichneumon vicinus* Cresson (*Pterocormus vicinus* Fattig)

Georgia: Brasstown Bald (Enotah Bald), April; Rabun Bald, May; Tray Mountain, June. No specimen.

Another somewhat dubious species, based on a single female from Illinois, of a not quite clear generic position. The records probably are incorrect.

17. *Ichneumon subdolus* Cresson (*Pterocormus subdolus* Fattig)

Georgia: Clayton, September. No specimen.

The record does not reveal the sex of the specimen; if it was a female, the species could hardly be misidentified; if a male, a misidentification could have been possible.

18. *Ichneumon trizonatus* Provancher (*Pterocormus trizonatus* Fattig)

Georgia: Blood Mountain, Hiawassee, June; Tray Mountain, July. No specimen.

This species can be misidentified easily, but, its occurrence in the most southern part of the Appalachian Chains is likely.

19. *Ichneumon laetus* Brulle (*Pterocormus laetus* Fattig)

Georgia: Blood Mountain, June; Neel Gap, May; Rabun Bald, June. 1 male, Rabun Bald, June.

This male differs from *laetus* male by considerably smaller size, white-marked coxae III (dorsally as well as ventrally), and narrower area superomedia; probably does not belong to *laetus*; comes closest to the neallotype of *tritatus* Heinrich, male, and in all probability belongs to that species. The record of *laetus* should be ignored.

20. *Pterocormus infidelis* Cresson is a synonym of *Orgichneumon calcatorius* Thunberg. No specimen.

Georgia: Blue Ridge, June; Gainesville, May; Tiger, June.

Orgichneumon calcatorius is extensively treated in this publication.

21. *Thyrateles lugubator* Gravenhorst (*Pterocormus rufiventris* Fattig)

Georgia: Athens, May; Atlanta, Gainesville, June; Macon, May. No specimen.

This record probably has been based on males in which case the correctness of this identification is questionable as these males are very similar to the *Ichneumon* male discussed above under No. 12 and 13.

22. *Thyrateles instabilis* Cresson (*Pterocormus instabilis* Fattig)

Georgia: Rabun Bald, July. No specimen.

23. *Eutanyacra succincta* (Brullé) (*Pseudamblyteles succinctus* Fattig)

Georgia: Blue Ridge, Dahlonega, June; Head River, July; Lakemont, June. No specimen.

The distribution of this species most likely extends southward into the southernmost parts of the Appalachian Chains; it also is easily identifiable in both sexes. There is no reason to doubt the authenticity of this record.

24. *Eutanyacra suturalis* (Say) (*Pseudamblyteles grotei* Fattig)
Georgia: Clayton, June; Hiawassee, April; Neel Gap, May. No specimen.
The records probably refer to males as the species *grotei* was described in the male sex only. This species is known to me only from the western and from the northern and northeastern parts of North America (a distributional pattern repeated in a number of species of Ichneumoninae).
25. *Spilichneumon bronteus* Cresson (*Amblyteles bronteus* Fattig)
Georgia: Cornelia, July; Gainesville, Madison, June; Perry, Rome, July. No specimen.
26. *Diphyus ormenus* Cresson (*Amblyteles ormenus* Fattig)
Georgia: Brasstown Bald (Enotah Bald), June; Rabun Bald, July. No specimen.
The occurrence of this species in the southern spurs of the Appalachian Mountains is likely.
27. *Ctenichneumon semicaeruleus* Cresson
Georgia: Blairsville, Gainesville, May; Tiger, April. No specimen.
28. *Ctenichneumon excultus* Cresson (*Ctenichneumon stadaconensis* Fattig)
Georgia: Blue Ridge, August; Dillard, May. No specimen.
29. *Probolus detritus* Brullé (*Probolus illaetabilis* Fattig)
Georgia: Fattig quotes for the record: "Transactions American Entomological Society, volume 6, page 190. (o.d. of *Amblyteles illaetabilis* Cresson, 1877)." No specimen.
30. *Probolus expunctus* Cresson (*Probolus indistinctus* Fattig)
Georgia: Atlanta, June. No specimen.
31. *Hoplismenus rutilus* Cresson
Georgia: Ringgold, July. No specimen.
The rather similar species, *praeruptus* Swift, has been recorded in this publication from 2 localities in Georgia; the possibility that Fattig's specimen belongs to that species must be considered.
32. *Rubicundiella perturbatrix* Heinrich (*Melanichneumon rubicundus* Fattig)
Georgia: Albany, May; Atlanta, May, July, August; Augusta, June; Clarkesville, August; Dalton, July; Gainesville, Perry, June; Tallapoosa, July; 1 male, Atlanta, 1-VIII-1928 in Fattig's collection. The specimen from Atlanta confirms the record of the species.
33. *Barichneumon libens* Cresson (*Melanichneumon soror* Fattig)
Georgia: Atlanta, May-July; Augusta, Calhoun, June; Cleveland, July; Colquit, Perry, June; Tray Mountain, July; 1 male, Atlanta, 17-VIII-1935.
This species is extensively treated in this publication.
34. *Virgichneumon subcyaneus* Cresson (*Melanichneumon subcyaneus* Fattig)
Georgia: Atlanta, June, July; Ringgold, July. No specimen.
35. *Cratichneumon duplicatus* Say
There are 6 specimens from Georgia in the collection, each provided with Fattig's identification label; none of these specimens belongs to the species *duplicatus* Say; they are:
Cratichneumon naumanni Heinrich (var. or subspecies with black propodeum); 1 female (without antennae), Stone Mt., 26-V-1927.
Melanichneumon honestus Cresson; 1 male, Atlanta, 1-VIII-1929.
Cratichneumon variegatus Provancher; 1 male, Atlanta, 4-VII-1929.
Cratichneumon, probably *horani* Heinrich, var.; 1 male, Atlanta, 5-V-1940.
Cratichneumon subfilatus Heinrich; 1 male, Stone Mt., 24-V-1927.
Cratichneumon paraparatus Heinrich; 1 male, Gainesville, Florida, 19-V-1919.
The record of *duplicatus* has to be rejected.
36. *Cratichneumon volens* Cresson (*Pterocormus brevipennis* Fattig)
Georgia: Atlanta, May; Blairsville, June; Gainesville, May; Ringgold, June; Toccoa, July. No specimen.
This species is treated extensively in this publication.
37. *Platylabus rubricapensis* Provancher
Georgia: Blood Mountain, Brasstown Bald, September; Rabun Bald, Yonah Mountain, August. No specimen.

This is a northern species, in the east recorded only from Newfoundland, Quebec, and Ontario. The southern records could rather refer to the similar species, *rubristernatus* Heinrich, separated from *rubricapensis* in 1962 (SNIS, p. 713).

38. *Tmetogaster nubilipennis* (Haldeman)
(*Conocalama nubilipennis* Fattig)
Georgia: Blairsville, July. No specimen.
39. *Conocalama copei* Cresson (*Conocalama copei*, var. *copei* Fattig)
Georgia: Blairsville, August; Toccoa, July. No specimen.
40. *Phaeogenes hebe* Cresson
Georgia: Blue Ridge, June; Clarkesville, May; Clayton, July; Neel Gap, June. No specimen.
41. *Phaeogenes soricultus* Provancher
Georgia: Blood Mountain, September; Brasstown Bald (Enotah Bald), Yonah Mountain, August. No specimen.
42. *Centeterus linearis* Provancher
Georgia: Clarkesville, May; Hiawassee, April. No specimen.

II. R. Duffield

specimens collected hibernating in Georgia

During recent years, R. Duffield collected a number of hibernating females of Ichneumoninae in Georgia in the southern spurs of the Appalachian Chains. The material is kept in the Emory University Museum and has been identified by myself. It contains the following species not recorded before from Georgia:

1. *Ichneumon heterocampae* (Cushman)
2. *Ichneumon anonymus* Heinrich
3. *Ichneumon grandisops* Heinrich
4. *Ichneumon pumiliops* Heinrich
5. *Aoplus confirmatus insignitior* Heinrich.
This subspecies is described in this publication and recorded from Tennessee and Missouri.

There are, in addition, 2 unidentified species of the genus *Ichneumon*, represented each by 1 specimen.

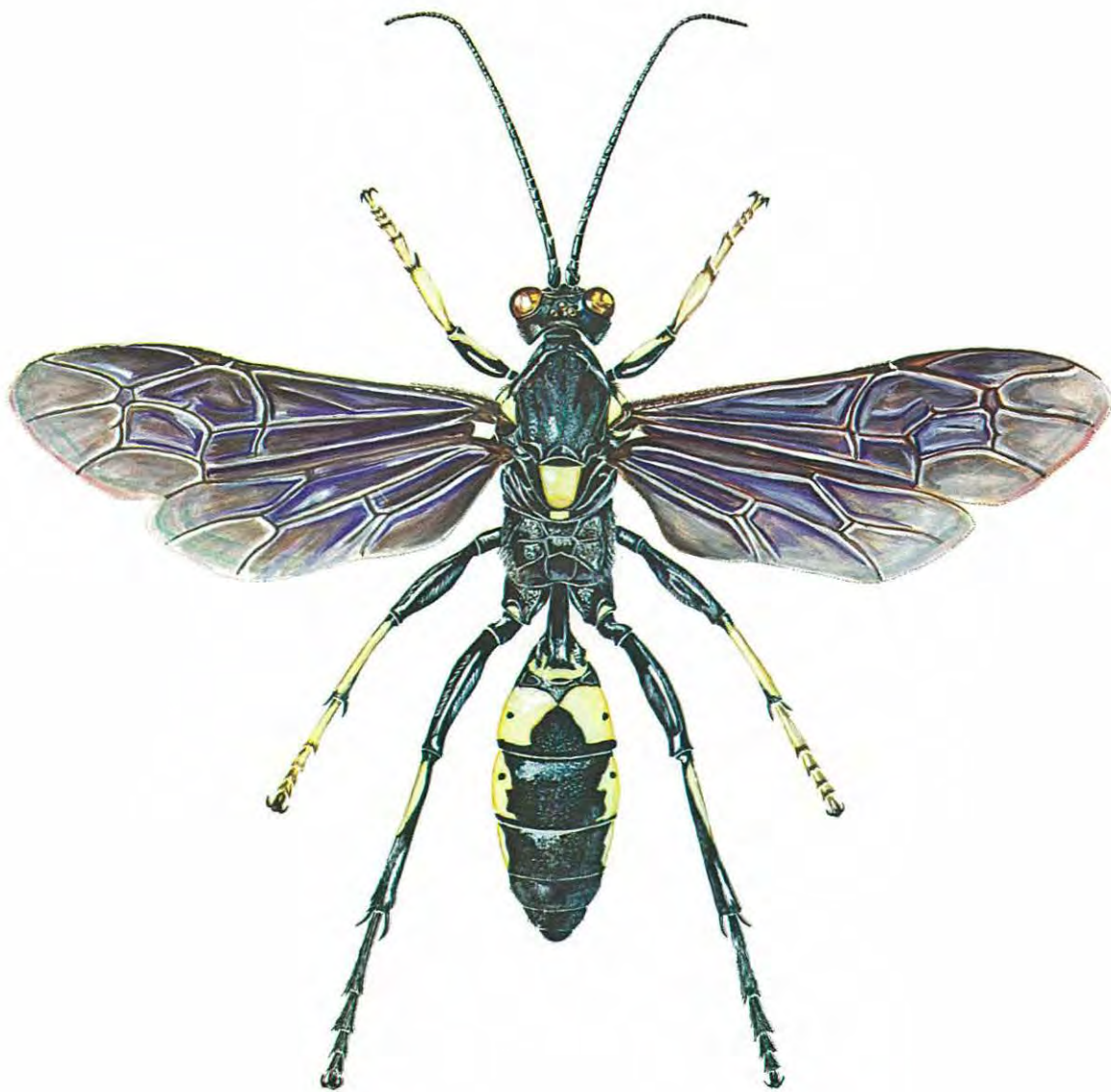


Plate 1. *Protopelmus atrocaeruleus* (Cresson), male.



Plate 2. *Cratichneumon floridensis* Heinrich, male.

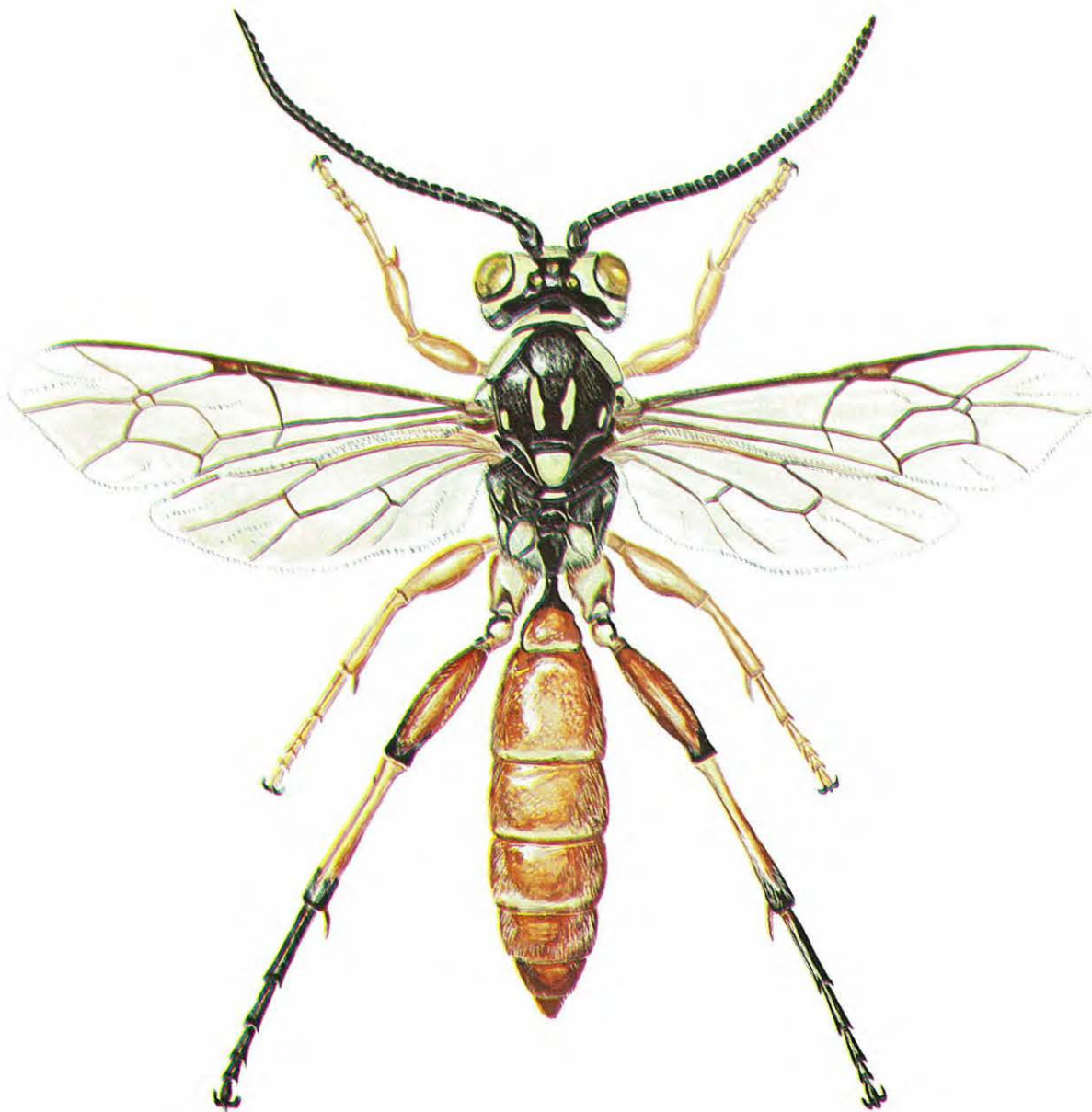


Plate 3. *Barichneumon archboldi* Heinrich, male.



Plate 4. *Barichneumon peramoenus calliandros* Heinrich, male.

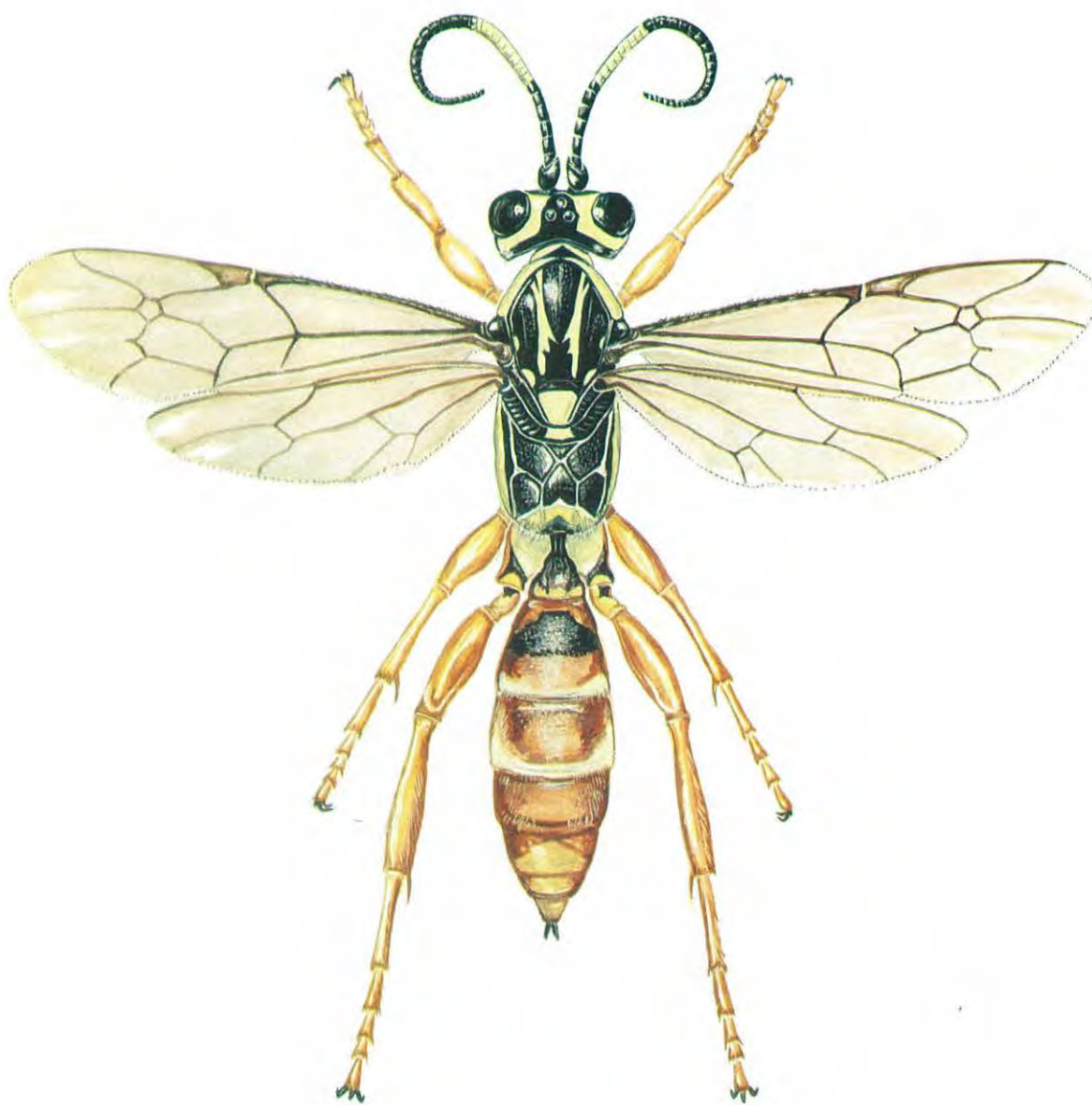


Plate 5. *Melanichneumon honestus milleri* Heinrich, female.

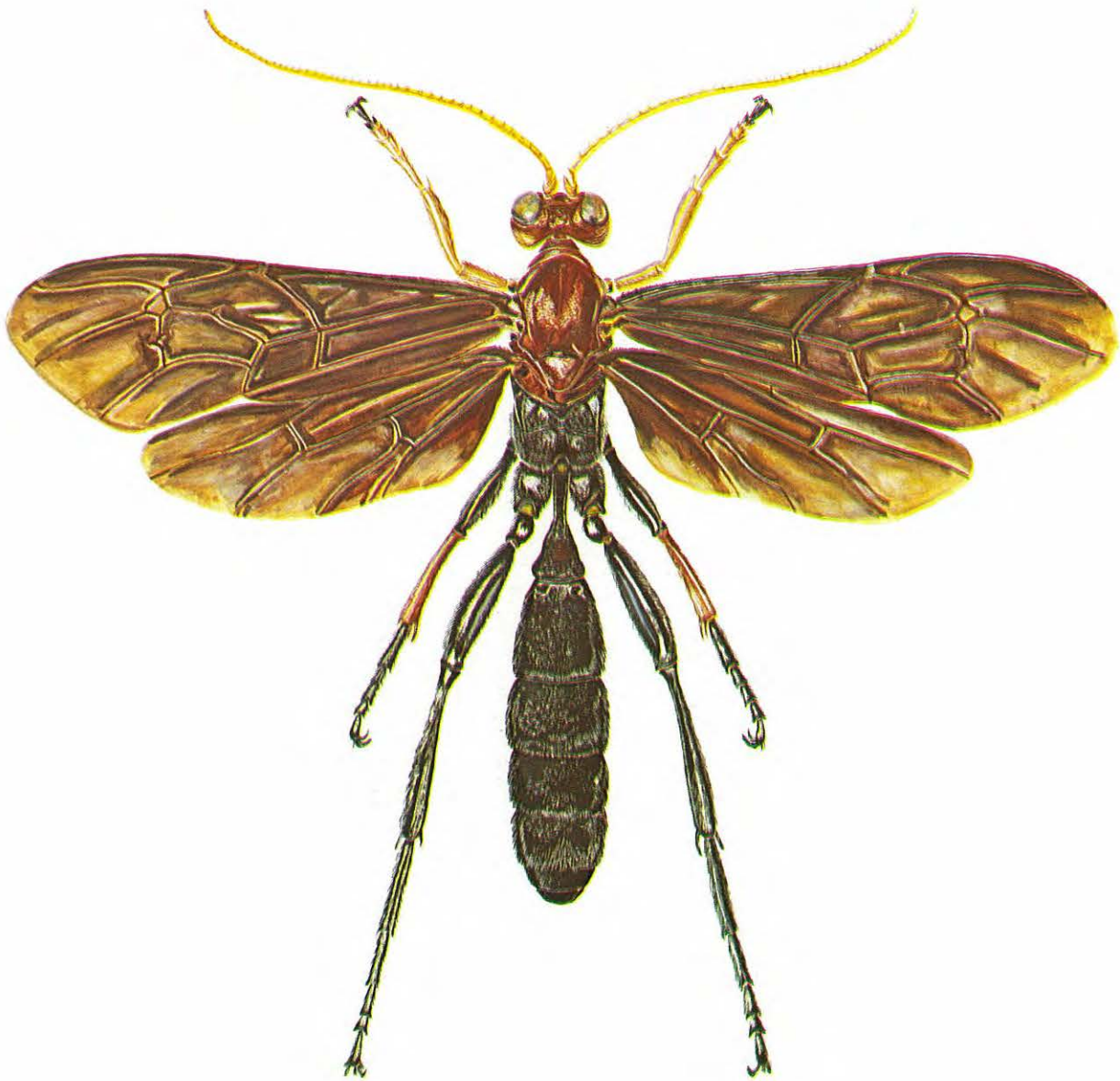


Plate 7. *Gnamptopelta obsidianator austrina* (Cresson), male.

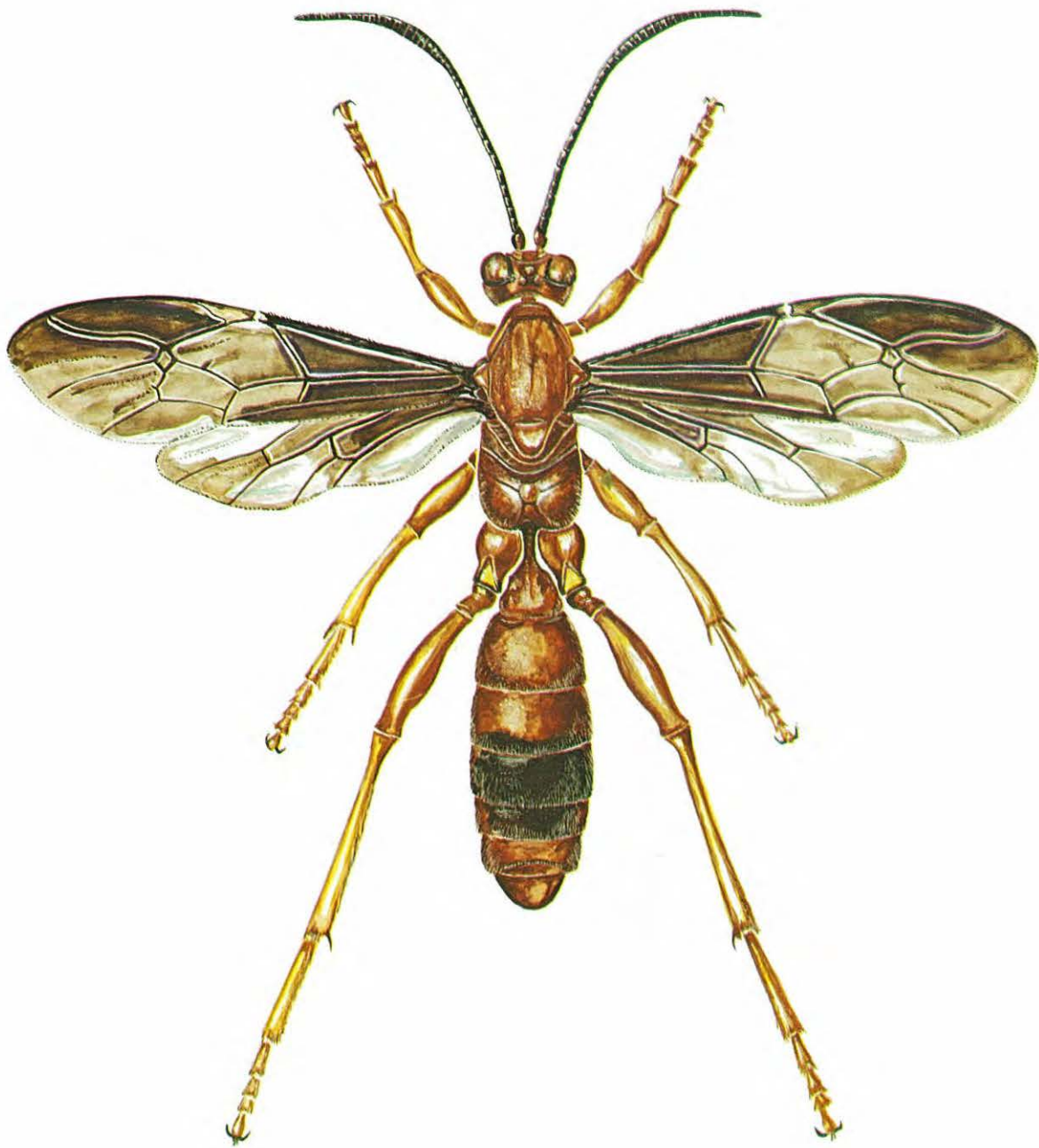


Plate 8. *Tricyphus elegans* (Cresson), male.

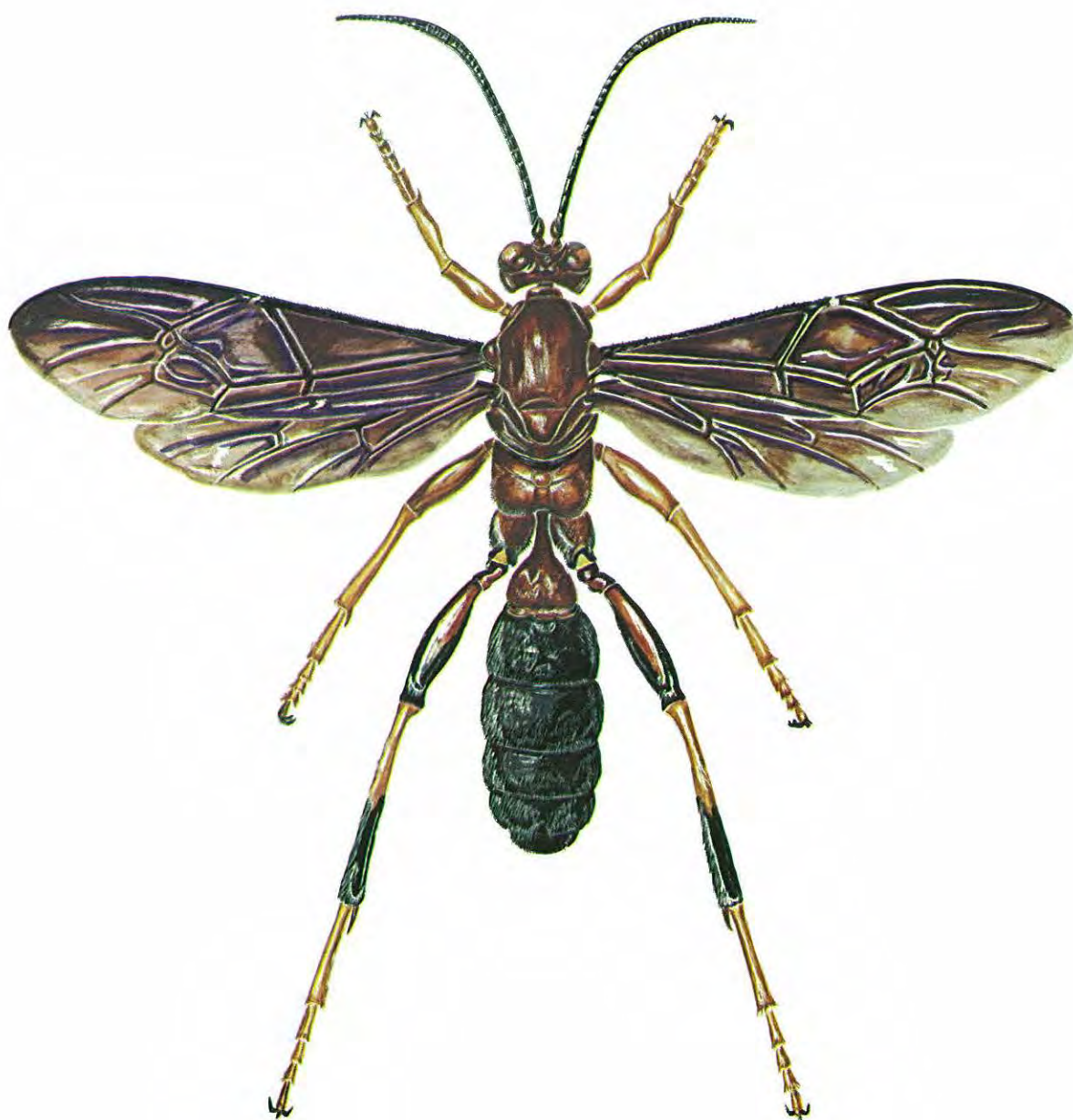


Plate 9. *Tricyphus floridanus* Heinrich, male.

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HOST INDEX

All known hosts of Ichneumoninae belong to the order Lepidoptera. The following is a list of larval or pupal hosts of Ichneumoninae included in this publication. Names in parentheses following the currently accepted names are those given in the sources of the host records, in the literature, on host labels on pinned ichneumonines, or in various other records from which host information was obtained.

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