

A REVISION OF THE NORTH AMERICAN SPECIES OF
ICHNEUMON-FLIES BELONGING TO THE GENUS METE-
ORUS HALIDAY.

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INTRODUCTION.

In this paper, which is a contribution from the gypsy moth and brown-tail moth division of the Bureau of Entomology, an attempt has been made to define the limits of the braconid genus *Meteorus* Haliday, and to prepare a key which will enable the worker in the parasitic Hymenoptera to identify the North American species of this group. Incidentally it was found necessary to describe a number of new species, several of which appear to be common.

The task of revising the genus was undertaken because the group is an important one economically and at the same time has been badly confused. Owing to the extreme variability of the species, erroneous determinations have been many; and host records that have been published are, in considerable part, incorrect. Fortunately, the collection in the United States National Museum, at Washington, District of Columbia, upon which this work is largely based, has extensive reared series of most species; and a good deal of additional material reared at the gypsy-moth laboratory at Melrose Highlands, Massachusetts, was also available. This has helped immeasurably in the selection of characters which will be found useful for the separation of species.

The types of most of our species are in the collections of the United States National Museum and the Philadelphia Academy of Sciences. To these and the types of the three species in the Connecticut Agricultural Experiment Station, in New Haven, Connecticut, I have had access. I have had no opportunity, however, of studying the following: The types of Provancher's species, which are in the Museum of Public Instruction, in Quebec, Canada; those of three of Viereck's species which are in the collection of Kansas University; that of *bakeri* Cook and Davis, which appears to have been lost; that of *vitticollis* Holmgren, which was evidently placed in a European

collection; and that of the European species, *versicolor* Wesmael, a parasite of the brown-tail moth, now well established in the New England States. In placing the Provancher and Viereck species just alluded to, I received valuable aid from notes made by Mr. A. B. Gahan upon a study of the types a few years ago and kindly loaned me for use in the preparation of this paper. The original description of *bakeri* is good, and this together with the authors' figure and the host record makes identification of this species comparatively easy; *vitticollis* Holmgren was poorly characterized, and I have been unable to place it; accordingly it has been omitted from the table of species. A large amount of authentic material of *M. versicolor*, in the collection of the gypsy-moth laboratory in Melrose Highlands, Massachusetts, has been studied, and used in assigning this species to its proper place in the key. Thirty-one valid species, besides *vitticollis*, are recognized as occurring in our fauna; of these 13 are new to science and are described in the following pages. It has been necessary to suppress 17 names as synonyms of previously described species; this is not surprising in view of the enormous extent of the variation found in nearly all forms.

I am indebted to Mr. A. F. Burgess, in charge of the gypsy-moth and brown-tail moth investigations, for permission to make the trips necessary for an examination of the type material; and to Messrs. A. B. Gahan and S. A. Rohwer, of the Bureau of Entomology, for many helpful suggestions and for criticism of the manuscript. Thanks are due Dr. J. C. Bradley, of Cornell University, for the loan of all the *Meteorus* material in that institution; also Mr. C. W. Johnson, of the Boston Society of Natural History; Mr. Nathan Banks, of the Museum of Comparative Zoology in Cambridge, Massachusetts, and Dr. C. T. Brues, of Harvard University, for the loan of specimens. Prof. R. H. Pettit, of the Michigan Agricultural Experiment Station, very kindly sent me a specimen which was supposedly the type of *bakeri* Cook and Davis, but which, it was found later, had not been included in the type series, the original series of three specimens having apparently disappeared.

CLASSIFICATION.

Superfamily ICHNEUMONOIDEA.

Family BRACONIDAE.

Subfamily METEORINAE.

Genus METEORUS.

Meteorus HALIDAY, Entom. Mag., vol. 3, 1835, p. 24. Genotype.—*Meteorus filator* Haliday. (By designation of Viereck, Proc. U. S. Nat. Mus., vol. 39, 1911, p. 401.)

Protelus FOERSTER, Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862, p. 253. Genotype.—*Perilitus chrysophthalmus* Nees (Monobasic).

Zemiotes FOERSTER, Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862, p. 253. Genotype.—(*Perilitus albitarsis* Nees)=*Meteorus albitarsis* (Curtis) (Monobasic).

Perilitus FOERSTER (not Nees), Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862, p. 253. Genotype.—*Perilitus pallidus* Nees (Monobasic).

Saprotichus HOLMGREN, Eug. Resa Zool. Ins., 1868, p. 430. Genotype.—*Saprotichus chinensis* Holmgren. (By designation of Viereck, Bull. U. S. Nat. Mus., 83, 1911, p. 130).

Head transverse, at least as broad as thorax; maxillary palpi 6-segmented; labial 3-segmented; mandibles bidentate, fitting closely against clypeus; clypeus well defined, separated from the face by an impressed line; antennae slender, varying in number of segments from about 20 to about 50, the number not constant within the species, but ranging within rather narrow limits; eyes moderate to large, always sparsely pubescent; ocelli extremely variable in size, but fairly constant within the species; occiput temples, cheeks, margined; prepectus marked off by a distinct carina; mesonotum with parapsidal grooves, these usually ending in a rather large, slightly sunken, roughened area posteriorly; disk of scutellum more or less convex; propodeum not regularly areolated, usually rugoso-reticulate, but sometimes with four rather well-defined areas on dorsal face; legs slender; inner spur of posterior tibiae never more than half as long as metatarsus, usually much shorter; anterior wings with three cubital cells, the second complete and subtrapezoidal, narrowed toward radius, and usually oblique; first cubital cell always separated from first discoidal, radius made up of three abscissae, the first two short, occasionally of equal length, but the first usually shorter than second; radial cell moderate to large; recurrent vein interstitial with first intercubitus, or entering either first or second cubital cells near first intercubitus; nervulus variable, but usually somewhat postfurcal; posterior wing with a long narrow radiellian cell, which usually narrows slightly toward apex, but in a few species (genus *Zemiotes* of Foerster) distinctly broadens apically, and then is divided by an indistinct transverse nervure before middle, or is at least somewhat constricted at this point; nervellus straight, not branched; lower

abscissa of basella never parallel with subcostella and never on a line with the mediella; abdomen ovate or lanceolate, and petiolate, very rarely subpetiolate; spiracles of first segment placed at or very near the middle, more often a little behind than before; first tergite usually sculptured, and in some species provided with two conspicuous fossae (called "tracheal grooves" by Marshall) anterior to the spiracles; remainder of abdomen smooth and polished; segments two and three connate, and longer and broader than the following; hypopygium not prominent; ovipositor sheaths varying in length from slightly less than half as long as the abdomen to longer than the entire body.

The genus *Meteorus* as here considered constitutes the subfamily *Meteorinae* as that is understood at the present time. Szepligeti¹ recognized *Zemiotes* Foerster as a good genus, distinguished from *Meteorus* by the broadening, divided radiellian cell; but while this character is conspicuous, it does not appear to be of more than specific or possibly subgeneric value in this group. The five known North American species of *Meteorinae* possessing a broadening divided radiellian cell, are included in this paper as species of *Meteorus*. *Saprotichus* Holmgren was suppressed as a synonym of *Meteorus* Haliday by Szepligeti,² and this opinion has been supported by Dr. A. Roman.³ There can be no doubt that this view is correct. *Perilitus* Foerster (not Nees) and *Protelus* Foerster were originally separated from *Meteorus* on characters which are absolutely valueless in this group from a generic standpoint, and of little importance even specifically. Szepligeti correctly placed these in the synonymy of *Meteorus*. *Aridelus* Marshall, which was included in the *Meteorinae* by Ashmead,⁴ has been referred to the *Euphorinae* by Szepligeti, where it apparently belongs. The open second cubital cell, the short radial cell, the confluence of the first discoidal and the first cubital cells, and the habitus (which is that of *Wesmaelia* Foerster), certainly ally this genus more closely to genera in the *Euphorinae* than to *Meteorus*. It must be conceded, however, that *Meteorus* alone does not form a natural group as distinct from the *Euphorinae*; and it is only provisionally that it is retained here as a separate subfamily.

Little difficulty should be encountered in distinguishing between species of *Meteorus* and related groups, if the important points in the foregoing detailed generic characterization are borne in mind. The wing venation and the petiolate abdomen will separate members of this genus from any other group with which they can possibly be confused.

Our knowledge of the habits and biology of the species of this genus is rather meager, being limited to a few of the economically more

¹ Gen. Ins., fasc. 22, 1904, p. 177.

Idem, p. 177.

² Ent. Tids., vol. 31, 1910, p. 132.

Proc. U. S. Nat. Mus., vol. 23, 1900, p. 117

important forms. It appears that most of our known species are internal parasites of lepidopterous larvae; but a few are said to attack the larvae of fungivorous Coleoptera. This rather marked variation in habit has been noted among the European species of *Meteorus* also, species like *obfuscator* Nees, *profligator* Haliday, and *filator* Haliday having been mentioned as parasites of fungivorous beetle larvae.⁵ There is not sufficient correlation between this habit and structural characters, however, to permit the separation of the parasites of Coleoptera from those attacking Lepidoptera as distinct

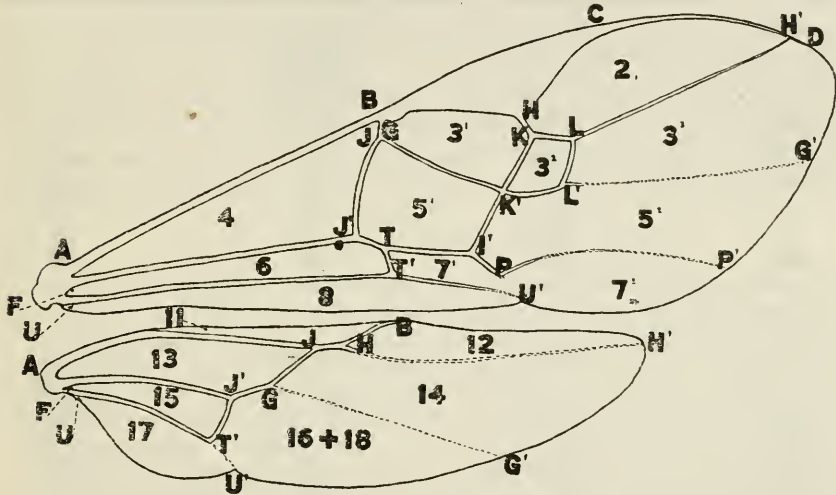


FIG. 1.—WINGS OF *METEORUS HYPHANTRIAE* RILEY. VEINS.—ANTERIOR WING: AB=COSTA; BC=STIGMA; CH'D=METACARPUS; HKH'=RADIUS; GK'G'=CUBITUS; FJ'=MEDIUS; J'T'P=DISCOIDEUS; PP'=SUBDISCOIDEUS; UT'=SUBMEDIUS; T'U'=BRACHIUS; JJ'=BASAL VEIN; KK'=1ST INTERCUBITUS; LL'=2D INTERCUBITUS; K'I'=RECURRENT VEIN; TT'=NERVULUS. POSTERIOR WING: AJB=SUBCOSTELLA; HH'=RADIELLA; GG'=CUBITELLA; FJ'=MEDIELLA; UT'=SUBMEDIELLA; T'U'=BRACHIELLA; JG=UPPER ABSCESSA OF BASELLA; GJ'=LOWER ABSCESSA OF BASELLA; J'T'=NERVELLUS. CELLS.—2=RADIAL CELL; 3=CUBITAL CELLS; 4=MEDIAN CELL; 5=DISCOIDAL CELLS; 6=SUBMEDIAN CELL; 7=BRACHIAL CELLS; 8=ANAL CELL; 11=COSTELLAN CELL; 12=RADIELLAN CELL; 13=MEDIELLAN CELL; 14=CUBITELLAN CELL; 15=SUBMEDIELLAN CELL; 16+18=DISCOIDELLAN+BRACHIELLAN CELLS; 17=ANELLAN CELL. THE LETTERING AND NUMBERING USED ARE THOSE EMPLOYED BY ROHWER AND GAHAN IN THEIR HORISMOMOLOGY OF THE HYMENOPTEROUS WING, PROC. ENT. SOC. WASH., VOL. 18, 1916, PP. 20-76.

taxonomic groups. Furthermore, I believe more exact rearing data are necessary before we can entirely accept the records from beetle larvae. It is quite possible that in some instances at least lepidopterous, and not coleopterous, fungivorous larvae were the hosts. One of our species, *humilis* Cresson, has been recorded from *Orchesia*, and also from *Tinea*, indicating, if the records are correct, that no discrimination is made between lepidopterous and coleopterous larvae, providing only that both are working in fungus.

The full-grown larvae of most of our species of *Meteorus* make characteristic pensile cocoons, often found hanging from limbs or the

⁵ Ratzeburg, Ichn. d. Forstinsect., vol. 2, 1848, p. 55, and vol. 3, 1852, p. 59; Marshall, Trans. Lond. Ent. Soc., 1887, pp. 105, 121, 123.

smaller twigs of trees. The fine suspending thread is usually several inches, not uncommonly 8 to 10 inches, in length. It may be that this suspension of the cocoons provides a certain degree of protection against secondary parasites; still, I have always reared hyperparasites in abundance from field-collected cocoons of species of *Meteorus*.

In the following key, as also in the descriptions and discussions of the various species, frequent reference is made to wing characters. I have employed throughout this paper the terminology adopted by Rohwer and Gahan in their "Horismology of the Hymenopterous Wing."⁶ The explanation of the wing figure included in the present

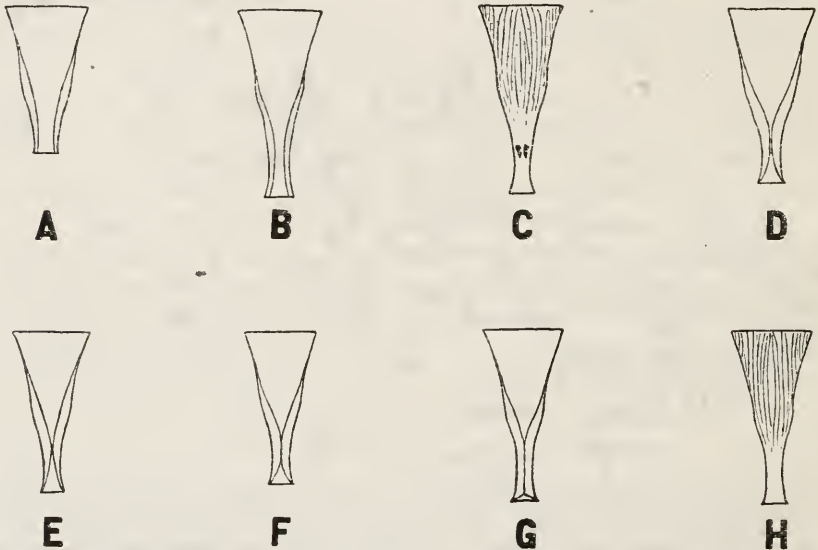


FIG. 2.—A—VENTER, FIRST ABDOMINAL SEGMENT OF *M. TIBIALIS*, SHOWING VENTRAL MARGINS OF THE TERGITE. B—VENTER, FIRST ABDOMINAL SEGMENT OF *M. COMMUNIS*. C—DORSUM, FIRST ABDOMINAL SEGMENT OF *M. COMMUNIS*, SHOWING THE PAIR OF FOSSAE ON PETIOLE. D—VENTER, FIRST ABDOMINAL SEGMENT OF *M. INDAGATOR*. E—VENTER, FIRST ABDOMINAL SEGMENT OF *M. DIMIDIATUS*. F—VENTER, FIRST ABDOMINAL SEGMENT OF *M. VULGARIS*. G—VENTER, FIRST ABDOMINAL SEGMENT OF *M. HYPHANTRIAE*. H—DORSUM, FIRST ABDOMINAL SEGMENT OF *M. HYPHANTRIAE*, SHOWING ABSENCE OF FOSSAE ON PETIOLE.

paper will prevent any possible misunderstanding regarding the meaning of the terms used. Much care has been taken in the selection of characters employed in the key; yet, so wide is the variation occurring in nearly all species that identification of specimens representing the extremes of their respective species will possibly occasion some difficulty. The presence or absence of the dorsal fossae on the petiole is easily determined and this character serves to divide the genus into two rather well-marked groups. The five species which are taken out at the beginning of the key because they possess a broadening divided radiellian cell, are also provided with a pair of dorsal fossae on the petiole, and are most closely allied to *communis*. The degree

⁶ Proc. Ent. Soc. Wash., vol. 18, 1916, pp. 20-76.

of approximation of the ventral margins of the first abdominal tergite (several types of which are illustrated) is relatively very constant and will be found extremely helpful in identifying specimens of this genus. Other useful characters are found in the wings; while there is always more or less variation here, as used in the key these characters will probably be found good. There is some variation within species in the size of the ocelli; those of the males are as a rule a little smaller than in the female, and even in the same sex slight variations occur; yet, considerable reliance can be placed upon this character, as also upon the length of the malar space. The number of antennal segments varies within quite definite limits, and to a certain extent is dependable for the separation of species. In the case of the females the length of the ovipositor sheaths helps greatly in making identifications. Color and sculptural characters are the most variable of all, and must be used with much care, but where they have been employed in the following key they are apparently of considerable value.

KEY TO THE NORTH AMERICAN SPECIES OF METEORUS.

1. Radiellian cell distinctly broadening toward apex and divided by an indistinct cross-vein; second abscissa of radius usually longer than second intercubitus. 2
Radiellian cell narrowing or at least not broadening, toward apex and with no indication of a cross-vein; second abscissa of radius never longer, usually shorter, than second intercubitus.....6
2. Mesopleura entirely smooth and polished; antennae with about 30 segments; posterior tarsi brownish.....1. *levis*, new species.
Mesopleura closely punctate or finely rugulose on lower half; antennae with 37-50 segments.....3
3. Ovipositor sheaths nearly as long as the abdomen; body color deep ferruginous, the thorax, especially in the sutures, and often base and apex of abdomen, tinged with blackish; antennae brown, except scape beneath; posterior tibiae black on apical half; posterior tarsi white; nervellus decidedly longer than lower abscissa of basella.....2. *niveitarsis* (Cresson).
Ovipositor sheaths only half as long as the abdomen; otherwise not agreeing with all the above characters.....4
4. Lower abscissa of basella about equal to nervellus; ocell-ocular line a little longer than greatest diameter of an ocellus; antennae testaceous; posterior tarsi pale yellow or whitish.....3. *pallitarsis* (Cresson),
Lower abscissa of basella much shorter than nervellus; ocell-ocular line no longer than diameter of an ocellus; antennae and tarsi variable.....5
5. Length about 10 mm.; antennae with 43-47 segments; posterior tarsi whitish.....4. *maximus*, new species.
Length 5-6 mm.; antennae with 38-42 segments; all tarsi testaceous or fuscous.....5. *reticulatus*, new species.
6. Petiole of abdomen with two deep fossae dorsally anterior to the spiracles; ventral margins of first abdominal tergite usually widely separated, at most barely touching and then diverging again; mesonotal lobes prominent and sharply defined.....7
Petiole of abdomen without fossae dorsally; ventral margins of first abdominal tergite meeting, although sometimes for only a short distance; mesonotal lobes often not so well defined.....19

7. Ocelli very small, the greatest diameter of a lateral ocellus only half, or less than half, the length of the ocell-ocular line, very rarely a little larger, and then radial cell exceptionally long, the radius going to extreme apex of wing, and the first abscissa of radius about equal to second.....10
 Ocelli larger, the ocell-ocular line not nearly twice as long as diameter of an ocellus; radius always reaching margin much before extreme apex of wing....8
8. Pro- and mesopleura mostly smooth and shining, the latter with a longitudinal crenulate furrow; the ventral margins of first abdominal tergite widely separated; the venter of petiole at base rather coarsely roughened; second abscissa of radius usually nearly as long as the second intercubitus; ovipositor sheaths about half as long as the abdomen; stigma, in female, wholly pale yellow, in the male usually brown; antennae with 33-36 segments....6. **communis** (Cresson).
 Propoleura closely, finely rugulose, and not so shining; ventral margins of first abdominal tergite not so widely separated, sometimes meeting; venter of petiole at base not so coarsely roughened, usually very smooth; ovipositor sheaths about two-thirds as long as the abdomen or longer; stigma, in both sexes, brown except along anterior margin; antennae of females with 29-32 segments, of males with 29-35 segments.....9
9. Posterior declivity of propodeum rather abrupt and distinctly hollowed out medially; eyes very large, the face narrow, the malar space exceedingly short; second abscissa of radius usually but little longer than first abscissa and only half as long as first intercubitus; ovipositor sheaths three-fourths as long as the abdomen; male antennae with 29-32 segments.....7. **indagator** (Riley).
 Posterior declivity of propodeum not so abrupt nor so conspicuously hollowed out medially; face broader, at least as broad at base of clypeus as long between insertion of antennae and base of clypeus; second abscissa of radius usually about twice as long as the first, and distinctly more than half as long as first intercubitus; ovipositor sheaths two-thirds as long as the abdomen; male antennae with 33-35 segments.....8. **loxostegi** Viereck.
10. Wings distinctly a little infumated; lower abscissa of basella usually longer than nervellus.....11
 Wings hyaline, occasionally with a faint yellowish tint; lower abscissa of basella very rarely longer than nervellus.....14
11. Thorax usually stout; first abdominal tergite with rather coarse striae and strongly shining; first discoidal cell petiolate, the petiole unusually long, longer than first abscissa of radius; ovipositor sheaths two-thirds as long as the abdomen.....9. **politus** (Provancher).
 Thorax very slender; first abdominal tergite finely closely ruguloso-striate or punctato-striate and opaque; petiole of first discoidal cell much shorter; ovipositor sheaths at least three-fourths as long as the abdomen; abdomen very slender.....12
12. First abscissa of radius only one-third as long as second; recurrent vein interstitial with first intercubitus; petiolar fossae very small; ovipositor sheaths a little longer than the abdomen; a very small species, less than 3 mm. in length.....10. **provancheri** Dalla Torre.
 First abscissa of radius at least half as long as second; recurrent vein entering first cubital cell; petiolar fossae rather large; ovipositor sheaths never longer, usually distinctly a little shorter, than the abdomen.....13
13. Lower abscissa of basella decidedly longer than upper abscissa and at least one and one-half times as long as nervellus; vertex of head and mesonotal lobes finely shallowly punctate; the very large eyes of the female strongly convergent, the face very narrow, narrower at base of clypeus than long between insertion of antennae and base of clypeus.....11. **angustipennis** new species.
 Lower abscissa of basella shorter than upper abscissa and very little longer than nervellus; vertex and mesonotal lobes polished; face of female not so narrow, distinctly broader at base of clypeus than long between insertion of antennae and base of clypeus.....12. **fumipennis**, new species.

14. Posterior coxae somewhat roughened and opaque on outer face; second abscissa of radius about twice as long as first; malar space a little shorter than basal width of mandibles; female antennae about as long as head and thorax united with 23-26 segments; ovipositor sheaths slightly longer than abdomen.
13. *humilis* (Cresson).
Posterior coxae smooth and polished, rarely weakly punctate near base and then not combining all the above characters.....15
15. Antennae slender and composed of 33-37 segments, very rarely with only 31 or 32; first flagellar segment a little shorter than second; posterior tibiae brown or blackish, except at extreme base and sometimes along upper margin; ovipositor sheaths slightly longer than body, where female is known.....16
Antennae and posterior tibiae not as above; ovipositor sheaths either longer than the entire body or shorter than abdomen.....17
16. Face smooth, practically without sculpture; first tergite irregularly wrinkled before apex, the spiracles prominent; second tergite black; stigma uniformly brown.....14. *alaskensis* (Ashmead)
Face coarsely coriaceous or finely rugulose; first tergite with complete, strong striae; second tergite ferruginous; base of stigma pale. .15. *tibialis*, new species.
17. Malar space in both sexes at least as long as basal width of the unusually broad mandibles; second abscissa of radius about twice as long as first; ovipositor sheaths somewhat longer than the entire body. . . .16. *terebratus*, new species.
Malar space not as long as basal width of the more normal mandibles; second abscissa of radius much less than twice as long as first; ovipositor sheaths a little shorter than abdomen.....18
18. Ocell-ocular line two and one-half times as long as greatest diameter of an ocellus; first abscissa of radius shorter than second; female antennae much shorter than the body, with 23-25 segments, those beyond middle as broad as long.
17. *hicoriae*, new species.
Ocell-ocular line usually not distinctly twice as long as greatest diameter of an ocellus; first abscissa of radius usually as long as second; antennae of both sexes about as long as the body, and with 30-34 segments. .18. *trachynotus* Viereck.
19. Ocell-ocular line three times, or nearly, as long as the greatest diameter of an ocellus; head large; clypeus unusually large and flat; abdominal petiole very slender; the ventral margins of the first tergite joined for half the length of the segment; female antennae bright yellow, blackish at apex, 22-24 segmented; male antennae fuscous, more slender, 29-31 segmented; ovipositor sheaths about as long as the abdomen.....19. *tauricornis* (Provancher).
Ocell-ocular line rarely twice as long as greatest diameter of an ocellus; clypeus normal, convex; female antennae longer; ovipositor sheaths never as long as the abdomen.....20
20. Ventral margins of first abdominal tergite meeting at base of petiole and touching for nearly half the length of the segment; ocelli large, the ocell-ocular line very rarely one and one-half times as long as the diameter of an ocellus; petiole, at least basally, always pale, the postpetiole usually more or less black.24
Ventral margins of first tergite meeting considerably beyond extreme base of petiole, and at most joined for only a short distance; ocelli smaller, the ocell-ocular line usually one and one-half to two times as long as the diameter of an ocellus; first tergite uniformly black or brown, very rarely entirely yellowish. .21
21. Stigma brown, pale at base and apex or along anterior margin.....22
Stigma uniformly pale yellow, transparent.23

22. Wings usually subhyaline or somewhat fuliginous; recurrent vein sometimes entering second cubital cell at extreme base, but often interstitial with first intercubitus; lower abscissa of basella nearly always a little longer than either nervellus or upper abscissa of basella; ovipositor sheaths about two-thirds as long as the abdomen.....20. *dimidiatus* (Cresson).
Wings perfectly clear hyaline; recurrent vein always distinctly entering second cubital cell; lower abscissa of basella not distinctly longer than nervellus or upper abscissa of basella; ovipositor sheaths about half as long as abdomen.
21. *bakeri* Cook and Davis.
23. Recurrent vein entering second cubital cell; antennae with 33-35 segments, very rarely with 32 or 36; mesonotal lobes polished, not distinctly punctate.
22. *autographae*, new species.
Recurrent vein interstitial with first intercubitus; antennae with 26-32 segments; mesonotal lobes closely shallowly punctate, not polished..23. *vulgaris* (Cresson)
24. Propleura, except along upper margin, wholly coarsely rugulose or ruguloso-punctate and not strongly shining; propectus roughened; propodeum evenly rugoso-reticulate, usually without prominent carinae, but with posterior declivity hollowed out medially; first tergite usually mostly smooth, the striae very fine and strongly convergent posteriorly.....25
Propleura not so completely rugulose, shining; otherwise not combining the above characters.....27
25. Body color usually ferruginous; wings often subhyaline or faintly tinted with brownish; male antennae fuscous; first abscissa of radius much shorter than second, the latter distinctly more than half as long as first intercubitus; malar space as long as basal width of mandible; ocell-ocular line distinctly longer than greatest diameter of an ocellus.....26
Body color pale testaceous; wings hyaline; antennae of both sexes pale; first abscissa of radius nearly as long as second, the latter about half as long as first intercubitus; malar space shorter than basal width of mandible.
24. *laphygmae* Viereck.
26. Female antennae 33-35 segmented; male antennae 34-37 segmented; recurrent vein always entering first cubital cell near apex; intercubital veins usually almost parallel; nervellus about equal to lower abscissa of basella.
25. *proximus* (Cresson).
Female antennae 28-31 segmented; male antennae with 32-35 segments; recurrent vein usually interstitial with first intercubitus; intercubital veins not so nearly parallel; nervellus always longer than lower abscissa of basella.
26. *arizonensis*, new species.
27. Head flat behind, descending vertically behind lateral ocelli; occipital carina very poorly defined medially, sometimes incomplete; first abscissa of radius as long as the second; recurrent vein entering second cubital cell; propodeum short, the posterior declivity abrupt; propodeum, apex of posterior coxae below, and the discal trochanters below, black or brown.
27. *acronyctae*, new species.
Head not so flat behind; occipital carina strong, complete; first abscissa of radius rarely as long as second; propodeum normal.....28
28. Recurrent vein entering first cubital cell; antennae with 27-30 segments, rarely 31 in the male.....28. *versicolor* (Wesmael).
Recurrent vein nearly always interstitial with first intercubitus or indistinctly entering extreme base of second cubital cell; antennae with 32-33 segments, rarely 31 in female.....29

29. Nervellus nearly twice as long as lower abscissa of basella; scutellum more than usually convex; last segment of maxillary palpi a little longer than the preceding segment.....29. *euschausiae*, new species.
 Nervellus not nearly twice as long as lower abscissa of basella; scutellum not so strongly convex; last segment of maxillary palpi not distinctly longer than the preceding segment.....30
30. Malar space in female as long as basal width of mandible; face a little broader than long between lower margin of antennal foramina and base of clypeus; ocell-ocular line slightly longer than diameter of an ocellus; first abdominal segment stout, the postpetiole unusually broad; ovipositor sheaths hardly half as long as the abdomen.....30. *datanae*, new species.
 Malar space in female much shorter than basal width of mandibles; face at least as long as broad; ocell-ocular line usually as long as diameter of an ocellus; postpetiole normal; ovipositor sheaths usually two-thirds as long as the abdomen.
 31. *hyphantriae* Riley.

1. *METEORUS LEVIS*, new species.

Differs from our other species that possess a broadening and divided radiellan cell in its smaller size, in the shorter antennae, and in the unusually smooth pleura.

Female.—Length 4.5 mm. Head transverse; face much broader than long between lower margin of antennal foramina and base of clypeus, smooth and polished; malar space a little more than half as long as basal width of mandible; eyes large, with sparse, exceedingly short, indistinct pubescence; antennae 30-segmented, the first flagellar segment a little longer than second; ocell-ocular line very slightly longer than greatest diameter of an ocellus; mesonotal lobes practically impunctate, polished; parapsidal furrows well marked, but very fine and shallow; scutellum nearly flat, polished; propodeum mostly smooth and shining, with a fine irregular transverse carina near base, two sublateral carinae, and a median longitudinal carina on apical third; propleura very weakly punctate, strongly shining; mesopleura and metapleura smooth and polished; wings rather large; radial cell ending somewhat before apex of wing; first abscissa of radius about half as long as second, the latter nearly or quite as long as second intercubitus; recurrent vein interstitial with first intercubitus; radiellan cell distinctly broadening toward apex of wing, with a suggestion of a transverse division somewhat before middle; lower abscissa of basella at least as long as nervellus, but shorter than the upper abscissa of basella; legs very slender; spurs of posterior tibiae of equal length and nearly one-third as long as the metatarsus; abdomen a little longer than thorax; first abdominal segment as long as the remaining segments united, finely striate and provided with two dorsal fossae on the petiole anterior to the rather prominent spiracles, which are in the middle of the segment; ovipositor sheaths not distinctly half as long as the abdomen. Body color ferrugino-testaceous; scape of antennae concolorous with face; pedicel and flagellum slightly darker, the latter becoming dusky at apex;

legs testaceous, posterior tibiae and tarsi pale brownish; wings clear hyaline, stigma testaceous; first abdominal segment somewhat tinged with blackish at base.

Type locality.—Jemez Springs, New Mexico.

Type.—In the Cornell University collection.

Described from a single female specimen collected by John Woodgate, September 5, 1913.

2. METEORUS NIVEITARSIS (Cresson).

Perilitus niveitarsis CRESSON, Canad. Entom., vol. 4, 1872, p. 81.

Meteorus niveitarsis CRESSON, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Philadelphia Academy of Sciences.

The female of this species can be distinguished at once from our other species, which have a broadening radiellian cell, by its much longer ovipositor sheaths, which very nearly equal the length of the abdomen. The male is not so easily separated by structural characters; but the blackish markings in the thoracic sutures and usually at base and apex of abdomen, the black apical half or third of posterior tibiae, which contrasts strikingly with the pure white posterior tarsi, in conjunction with a nervellus longer than the lower abscissa of basella, will probably distinguish males of this species from those of closely related species. The antennae of the unique type are 40-segmented; other specimens show a range from 38 to 43 segments. In the female the ocell-ocular line is a little shorter, while in the males examined it is slightly longer, than the diameter of a lateral ocellus.

Distribution.—Massachusetts, Maine, Canada.

Host.—Unknown.

The above notes are based on the following material: The type and three additional specimens, all from Massachusetts, in the collection of the Philadelphia Academy of Sciences; one female from Ottawa, Canada, in the United States National Museum; four males, taken at Eastport, Maine, and one from Capens, Maine, which are in the collection of Dr. C. T. Brues, of Harvard University; and one male, from Eastport, Maine, in the collection of the Boston Society of Natural History.

3. METEORUS PALLITARSIS (Cresson).

Perilitus pallitarsis CRESSON, Canad. Entom., vol. 4, 1872, p. 80.

Meteorus pallitarsis CRESSON, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Philadelphia Academy of Sciences.

This species is rather easily distinguished from related species by the characters noted in the key. In color it is uniformly testaceous; the stigma in female pale yellow, in male light brown; malar space in male is distinctly more than half as long as basal width of mandible, in female much shorter; in all the specimens seen the lower

abscissa of basella is about equal to nervellus, and also subequal with upper abscissa of basella; in size the species agrees with *niveitarsis*, being about 6 mm. in length.

Distribution.—New Jersey, Pennsylvania, Rhode Island, Massachusetts, New Hampshire, Vermont.

Host.—Unknown.

The foregoing discussion is based on the following specimens: The type, which is a male from New Jersey; two other males in the Philadelphia Academy of Sciences, with no locality data; five specimens, representing both sexes, in the collection of the Boston Society of Natural History, four of these having been taken at Mount Equinox, Vermont, and one at Chester, Massachusetts, by Mr. C. W. Johnson; one female from Ridgewood, New Jersey, in the Cornell University collection; five specimens, including both sexes, in the collection of Dr. C. T. Brues, from the following localities—Woods Hole, Chester, and Williamsburg, Massachusetts; Cornish, New Hampshire; and Buttonwoods, Rhode Island; and one male from Roxboro, Pennsylvania, in the collection of Mr. A. B. Champlain, of Harrisburg, Pennsylvania.

4. METEORUS MAXIMUS, new species.

This is the largest of our North American species of *Meteorus* and resembles very closely the European *albiditarsis* Curtis. It apparently differs from the latter species in the somewhat longer radial cell, the much less prominent spiracles of the first abdominal segment, the more slender abdomen, and the slightly longer ovipositor.

Female.—Length 10 mm. Head transverse; face a little broader at base of clypeus than long, punctate, shining, slightly convex; maxillary palpi long, the last segment slightly longer than the preceding segment; eyes very large, extending nearly to the base of the mandibles, so that the malar space is almost wanting; antennae very long, 47-segmented, the first flagellar segment a little longer than scape and pedicel united; ocelli large, the greatest diameter of a lateral ocellus longer than the ocell-ocular line; temples strongly receding; occipital carina high, the shortest distance between it and a lateral ocellus about one and one-half times the diameter of an ocellus; mesonotal lobes well marked off, the parapsidal furrows sharp and deep, the lobes weakly punctate and shining. Disk of scutellum triangular, a little longer than broad at base; propodeum coarsely reticulated, with two short, rather smooth transverse basal areas; propleura punctato-rugulose anteriorly, and with transverse rugae in the depression; mesopleura with the lower half conspicuously sunken and finely closely punctate, and also with a rugulose area in the upper basal angle; wings with stigma narrow, three times as long as broad; nervulus slightly postfurcal; recurrent vein entering extreme apex of first cubital cell; first abscissa of radius less than half

as long as the second, the latter nearly as long as first intercubitus and longer than second intercubitus; last abscissa of radius slightly longer than last abscissa of cubitus; posterior wing with radiellan cell distinctly broadening toward apex and divided before the middle by an indistinct cross-vein; nervellus decidedly longer than lower abscissa of basella; posterior coxae long, smooth, almost polished; inner spur of posterior tibiae hardly one-third as long as the metatarsus; abdomen long, slender; first segment long, its spiracles placed about in the middle; the two dorsal fossae on petiole rather small, narrow and well separated; first tergite very weakly roughened, not striate, or with only a few irregular short striae laterally; ventral margins of first tergite widely separated; dorsum of abdomen beyond first tergite smooth and polished; ovipositor sheaths not quite half as long as the abdomen. Uniformly ferrugino-testaceous, with third, fourth, and fifth abdominal segments partly brown; antennae testaceous; wings hyaline, stigma yellowish, veins pale brown; legs testaceous; joints between posterior trochanters and femora blackish; posterior tarsi whitish.

Type locality.—Colorado.

Type.—Cat. No. 24966 U.S.N.M.

Described from three female specimens labeled "Colo., Collection Ashmead." One of the paratypes has 47-segmented antennae; the other specimen has the antennae broken.

There are in the national collection three other female specimens of this species, which were not included in the type series: one from Texas; one labelled "Wellington, Kansas, E. G. Kelly, Exp. No. 151539"; and one collected by E. S. Southworth, at New Salt, New York, July 16, 1903.

5. METEORUS RETICULATUS, new species.

Resembles *maximus*, but is much smaller; it differs further in its mostly fuscous antennae and in the posterior tarsi being testaceous or ferruginous rather than white.

Female.—Length 5.5 mm. Face about as broad at base of clypeus as long, weakly punctate, shining; eyes large, the malar space very short, as in *maximus*; antennae 39-segmented, the first and second flagellar segments of equal length; ocell-ocular line equal to greatest diameter of an ocellus; thorax slender; parapsidal grooves well defined; mesonotal lobes smooth and shining; propodeum reticulated, the interstices large and smooth, shining; in the type there are two short transverse basal areas and two rather large median areas moderately well defined; median longitudinal carina on propodeum more or less distinct; propleura closely punctate, the depression crenulate; mesopleura punctato-regulose on lower half, smooth and polished above; wings as in *maximus*, except that in the type the ner-

vulus is interstitial with basal vein; this character is variable, however, and of little significance; posterior coxae long, mostly polished, with only scattered weak punctures; inner spur of posterior tibiae about one-third as long as metatarsus; abdomen slender; the first segment narrow, the petiole provided with a pair of small, narrow, dorsal fossae; first tergite faintly roughened at base; weakly longitudinally roughened posteriorly, shining; ovipositor sheaths less than half as long as the abdomen. Uniformly ferruginous except the antennae which are mostly fuscous; legs, including posterior tarsi, concolorous with the body; wings hyaline, stigma yellow.

Male.—One antenna of allotype has 39 segments, the other 40; the pro-, meso-, and metapleura are more coarsely roughened; malar space about one-third the basal width of mandible; antennae fuscous, scape testaceous below; stigma dark brown.

Type locality.—Mount Washington, New Hampshire.

Allotype locality.—Hanover, New Hampshire.

Type.—Cat. No. 24967, U.S.N.M.

Described from two specimens, the type with only the locality data, the allotype labeled "Hanover, N. H., C. M. Weed."

One other female specimen that appears to belong to this species, and is labeled "Wash. Terr.," is in the National Museum. The ocell-ocular line is a little shorter than diameter of an ocellus, and the posterior tarsi are a little infuscated.

6. METEORUS COMMUNIS (Cresson).

Perilitus communis CRESSON, *Canad. Entom.*, vol. 4, 1872, p. 82, line 12.

Perilitus intermedius CRESSON, *Canad. Entom.*, vol. 4, 1872, p. 82, line 30.

Meteorus communis CRESSON, CRESSON, *Synops. Hymen.*, N. Amer., 1887, p. 228.

Meteorus intermedius CRESSON, CRESSON, *Synops. Hymen.*, N. Amer., 1887, p. 229.

Meteorus petiolariferus VIERECK, *Bull. 22, Conn. State Geol. and Nat. Hist. Survey*, 1917 (1916), p. 223.

Meteorus pretiosus VIERECK, *Bull. 22, Conn. State Geol. and Nat. Hist. Survey*, 1917 (1916), p. 223.

Type.—In the Philadelphia Academy of Sciences. The type of *intermedius* is in the same collection; those of *petiolariferus* and *pretiosus* are in the Connecticut Agricultural Experiment Station at New Haven. A paratype of *pretiosus* is in the collection of Bureau of Plant Industry at Harrisburg, Pennsylvania.

A thorough study of all the types convinces me that *communis*, *intermedius*, *petiolariferus*, and *pretiosus* are the same species. The rather marked difference between many males and the usual female is doubtless responsible for the names, *intermedius*, *petiolariferus*, and *pretiosus*, all of which were based on male specimens. Commonly, in the male the stigma and the antennal flagellum are much darker than in the female; the recurrent nervure often enters the first cubital cell, while in the female it is normally interstitial with the

first intercubitus; the body coloring of the male is generally darker; the propectus is often more or less blackish, and the mesonotal lobes are frequently infuscated, while the first abdominal tergite is nearly always wholly black or blackish and the apical abdominal segments are often dark. The fuscous or blackish markings are usually much less pronounced in the female or are wholly wanting.

Distribution.—Evidently distributed over the entire United States and much of Canada. One of our commonest species, especially in the eastern part of the country. I have seen material from the following States and Provinces: Connecticut, Massachusetts, Rhode Island, Maine, New Hampshire, Vermont, New York, Pennsylvania, North Carolina, Michigan, Colorado, Oregon, Quebec, Ontario, British Columbia.

Hosts.—Since other species of *Meteorus*, especially *hyphantriae*, have so often been determined as *communis* and the host records published as those of *communis*, I have considered it unwise to accept any of these records. The following list of hosts is taken from the labels on specimens of *communis* which I have examined: *Hadena procincta* Grote; *Graptolitha laticinerea* Grote; *Graptolitha*, species; *Cirphis unipuncta* Haworth; *Malacosoma americana* Fabricius.

Several hundred specimens, from numerous localities, have been studied in the course of the determination of the limits of this species. This material was from the following collections: That of the United States National Museum; Cornell University; the Boston Society of Natural History; that of Doctor Brues of Harvard University; that of Mr. Banks of the Museum of Comparative Zoology, Cambridge, Massachusetts; and the collection at the gypsy moth laboratory, at Melrose Highlands, Massachusetts.

7. METEORUS INDAGATOR (Riley).

Perilitus indagator RILEY, 4th Ann. Rpt. Ins. Missouri, 1872, p. 43.

Meteorus indagator Riley, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Meteorus campestris VIREECK, Trans. Kansas Acad. Sci., vol. 19, 1905, p. 281.

Type.—In the United States National Museum; the type of *campestris* is in the University of Kansas collection.

Very similar to *loxostegei* Viereck; but distinguished from that species by the characters given in the key. The ovipositor sheaths are noticeably longer than in *loxostegei*, being nearly as long as the abdomen; the mesopleura are usually more smooth and polished, with only a longitudinal crenulate furrow; and the ventral margins of the first tergite almost or quite touch, while they are distinctly separated in *loxostegei*. The first tergite, especially on the post-petiole, is finely granularly roughened between the longitudinal striae, which are usually not prominent; this type of sculpturing is found also in *loxostegei*. The face, especially in the female is noticeably narrower in *indagator*, the eyes being very large.

Distribution.—Missouri, California, Arkansas, Connecticut, Florida, North Carolina, South Carolina, Maryland, Kansas, Massachusetts. These are the States from which I have seen material; the species undoubtedly will be found over the entire country.

Hosts.—(*Acrobasis*) *Mineola juglandis* LeBaron (Riley); *Acrobasis betulella* Hulst; *A. caryivorella* Ragonot; *Mineola indigenella* Zeller; *Tetralopha subcanalis* Walker; *Dioryctria xanthaenobares* Dyar; *Tetralopha platanella* Clemens; *Acrobasis caryae* Grote (?); "leaf roller on honey locust"; "leaf roller on sweet fern"; and "leaf tyer on sweet gum." *M. indagator* has also been recorded by Riley and Howard⁷ from *Evergestis rimosalis* Guenée, by Howard⁸ from *Loxostege sticticalis* Linnaeus, and by Chittenden⁹ from *Peridroma saucia* Hübner. The last record is undoubtedly incorrect; very probably the parasite in this case was *M. vulgaris*. It is also quite possible that the records from *Evergestis* and *Loxostege* concerned *M. loxostegei* rather than *indagator*.

The above notes and host and locality records are based on a considerable amount of material in the United States National Museum and in the collection of the gypsy-moth parasite laboratory.

8. METEORUS LOXOSTEGEI Viereck.

Meteorus loxostegei VIERECK, Proc. U. S. Nat. Mus., vol. 39, 1911, p. 401.

Type.—In the United States National Museum.

As noted in the discussion under *indagator*, these two species are very similar; but they are certainly distinct and can be separated by the characters mentioned in the key and in the discussion just referred to.

Distribution.—The following States were represented by the material which I have seen: Colorado, Nebraska, New Mexico, Maryland, Massachusetts.

Hosts.—*Loxostege sticticalis* Linnaeus (Viereck); *Pyrausta futilalis* Lederer; and *P. nubilalis* Hübner.

Besides the type, there are seven other specimens in the United States National Museum from the type locality, Rocky Ford, Colorado, and from the same host as the type; also a large series reared from *Pyrausta futilalis* at College Park, Maryland, by Mr. A. B. Gahan. Six specimens reared from *L. sticticalis* in Nebraska, one specimen from Maxwell, New Mexico, and one labeled as reared from a "Nelumbians pyralid," but bearing no locality data, are likewise in this collection. The Boston Society of Natural History has one specimen taken at Woods Hole, Massachusetts. I have also seen two specimens reared from larvae of the introduced corn borer, *Pyrausta nubilalis*, collected at Watertown, Massachusetts.

⁷ Insect Life, vol. 3, 1890, p. 58.

⁸ Idem, vol. 6, 1894, p. 371.

⁹ Bull. 29, n. s., U. S. Bur. Ent., p. 34.

9. METEORUS POLITUS (Provancher).

Perilitus politus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 126.

Meteorus politus Provancher, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Museum of Public Instruction in Quebec, Canada.

Distinguished at once by the somewhat infumated wings and the unusually long petiole of the first discoidal cell. Usually the thorax is black, and the abdomen practically entirely reddish, although the latter is sometimes more or less blackish at base or apex; antennae of the female specimens I have seen have 25 segments, with the apical segment unusually large; the male antennae have 29 to 30 segments; radial cell narrow and short; nervulus interstitial with basal vein, or nearly; the nervellus is shorter than lower abscissa of basella, which is usually subequal with upper abscissa or a little shorter; first tergite rather coarsely striate, the ventral margins widely separated.

Distribution.—Canada; northeastern United States.

Host.—Unknown.

The National Collection has a homotype labeled as such by Mr. Gahan; this specimen has no locality label, but it is a Harrington specimen, and is probably from Ottawa. There is one other specimen, from Ottawa, Canada, in the United States National Museum. In the Cornell University collection there is a female of this species, from Coniston, Ontario; and in Doctor Brues's collection there are several specimens from Truro, Nova Scotia; and Petersham, and Barnstable, Massachusetts.

10. METEORUS PROVANCHERI Dalla Torre.

Perilitus gracilis PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 125.

Meteorus gracilis Provancher, CRESSON, Synops. Hymen. N. Amer., 1887, p. 228.

Meteorus provancheri DALLA TORRE (= *gracilis* PROVANCHER, preoccupied), Catalogus Hymenop., vol. 4, 1898, p. 112.

Type.—In the Museum of Public Instruction in Quebec.

Distribution.—Canada.

Host.—Unknown.

I have seen no specimens of this species; but have given it its place in the key on the basis of the original description and notes made by Mr. Gahan upon an examination of the type. It has been placed with *politus*, *angustipennis*, and *fumipennis* because Provancher mentioned slightly infumated wings. It is evidently an exceedingly small species. Following are Mr. Gahan's notes in part:

This is the smallest species known to me. Petiole apparently has very indistinct fossae above. Head full behind eyes; ocelli very small, postocellar line shorter than ocell-ocular line; antennae broken; first flagellar segment fully three times as long as thick, longer than scape and pedicel combined, and about equal to second flagellar segment; malar space less than base of mandible; face shining, faintly rugulose, vertex polished; mesonotum polished, the parapsidal grooves defined and faintly crenulate; propodeum with a median carina, two sublateral and two transverse carinae, one near

base and one at apex of truncation, all very weak; petiole ruguloso-striate, without fossae dorsally, or if present they are very indistinct; rest of abdomen smooth and polished; ovipositor nearly as long as thorax and abdomen together and only a little swollen at base; wings with stigma triangular, radius originating in the middle, first abscissa of radius not more than one-third the length of the second abscissa, the latter shorter than second transverse cubitus; nervulus very slightly postfurcal. Head and thorax dark succineous, abdomen blackish above.

This species seems to be very similar to *alaskensis* Ashmead, and may be identical with it, in spite of Provancher's mention of infumated wings. In the description of species belonging to other groups this worker has often referred to faintly subhyaline wings as "slightly infumated"; should that be the case here the species will run to *alaskensis* in the foregoing key.

11. METEORUS ANGUSTIPENNIS, new species.

A very slender species, with unusually narrow, somewhat infumated, wings; it is easily distinguished from *fumipennis* by the very long lower abscissa of basella, and by the finely punctate condition of the vertex and mesonotal lobes; from *politus* it is at once separated by the practically sessile first discoidal cell.

Female.—Length 3.2 mm. Head transverse, very slightly broader than thorax; eyes enormous, strongly convergent; face unusually narrow, its width at base of clypeus much less than its length from antennae to clypeus, very minutely sculptured; malar space so short as to be almost wanting; antennae missing beyond pedicel; ocellular line two and one-half times as long as greatest diameter of an ocellus; vertex, temples, and cheeks shining, distinctly very finely punctate; thorax very slender; mesonotal lobes prominent, minutely but distinctly sculptured, especially the middle lobe; lateral lobes meeting posteriorly; disk of scutellum very small, somewhat elevated, polished; propodeum rugoso-reticulate, with a suggestion of two large median areas on dorsal face; propleura, mesopleura except posteriorly, and the metapleura, coarsely rugulose; wings narrow; nervulus in type very slightly antefurcal; recurrent vein entering first cubital cell; first abscissa of radius as long as, or longer than, the second; last abscissa of radius attaining wing distinctly before apex; lower abscissa of basella at least one and one-half times as long as nervellus and decidedly longer than upper abscissa of basella; posterior coxae small, about as long as their trochanters, slightly roughened on outer face; inner spur of posterior tibiae about one-fourth as long as the metatarsus; abdomen very slender; the first tergite finely ruguloso-striate, especially on the postpetiole, and provided with two distinct dorsal fossae on the petiole; remainder of abdomen smooth and shining; ovipositor sheaths about as long as the abdomen. Black; face, clypeus and mandibles brown; wings distinctly infumated; stigma brown; paler at base; legs ferruginous-testaceous;

abdomen black, except the connate second and third tergites, which are ferruginous; ovipositor sheaths brown.

Male.—Like the female except as follows: Eyes much smaller, the face broader at base of clypeus than long; malar space nearly or quite equal to basal width of mandibles; antennae 31-segmented, pale yellow on basal half, dusky beyond; nervulus practically interstitial with basal vein; stigma mostly pale with a brownish blotch posteriorly.

Type locality.—Salineville, Ohio.

Type.—Cat. No. 24964, U.S.N.M.

Described from one female and one male, both from Salineville, Ohio, and bearing a label with Ashmead's manuscript name, *Proctetus ohioensis*. There is one other male specimen from Ohio in the National Collection; this is not included in the type series. I have also seen eight specimens of this interesting species in the Cornell University collection: three of these are from Ithaca, New York; five from Salineville, Ohio; a female specimen in this collection has complete antennae; they are 25-segmented, are slightly thickened toward apex and almost entirely pale yellow, being only a little infuscated at apex. A male of *angustipennis* was included by Cresson in his type series of *dimidiatus*; it bears paratype No. 1770.6 and is from Pennsylvania.

12. METEORUS FUMIPENNIS, new species.

Very closely allied to *angustipennis*, but distinguishable at once by the differences noted in the table to species.

Female.—Length 4 mm. Head transverse, but full behind the eyes, distinctly broader than thorax; face broader at base of clypeus than long, very minutely closely punctate laterally; palpi very slender; malar space about half as long as basal width of mandibles; antennae slender, 29-segmented, the apical segments shortened, but somewhat longer than broad; basal flagellar segment at least three times as long as thick; vertex smooth and polished, ocelli very small, the ocell-ocular line nearly three times as long as greatest diameter of an ocellus; thorax unusually slender, much narrower than head, and at least three times as long as its greatest breadth; mesonotal lobes well set off by sharp parapsidal furrows, the lateral lobes meeting at posterior margin of mesoscutum; the depression behind middle lobe of mesonotum rugulose and opaque; remainder of mesoscutum smooth and shining, with only a few scattered indistinct punctures; disk of scutellum small, triangular, slightly convex, smooth and shining; propodeum rugulose, with a median, two sublateral, and two transverse weak carinae marking off four rather large areas on the dorsal face, the two anterior areas narrow, transverse; propleura, mesopleura, except a small medial polished area, and metapleura entirely, rugu-

lose; wings narrow; stigma large, triangular; nervulus slightly post-furcal; recurrent vein entering first cubital cell near apical angle; first abscissa of radius shorter than second, sometimes subequal; radial cell short, ending much before apex of wing; last abscissa of radius shorter than last abscissa of cubitus; nervellus nearly or quite as long as lower abscissa of basella, which is distinctly shorter than the upper abscissa; posterior coxae small, about as long as their trochanters, polished; posterior tarsi about as long as their tibiae; the inner spur of hind tibiae about one-fourth the length of the metatarsus; abdomen slender; first tergite very finely striate, with two distinct fossae on the petiole above; remainder of abdomen smooth and polished; ovipositor sheaths slender, fully three-fourths as long as the abdomen. Black, face, clypeus, mandibles except tips, ferruginotestaceous; basal half of antennae ferruginous, apical half dusky; temples and cheeks dark ferruginous; a spot on the front extending to and including the ocelli, black; occiput black; thorax almost entirely black, with a little reddish on the prothorax and on mesoscutum posteriorly; wings distinctly a little infumated, the stigma brown, pale at base, veins yellowish-brown; legs ferruginous, posterior femora slightly darker than the rest; abdomen black, except second segment, which is brown.

Type.—Cat. No. 24963, U.S.N.M.

Type locality.—Easton, Washington.

Described from three female specimens apparently collected by Koebele. There are three additional females, from Santa Cruz Mountains, California, in the national collection; these have not been included in the type series.

13. METEORUS HUMILIS (Cresson).

Perilitus humilis CRESSON, Canad. Entom., vol. 4, 1872, p. 84.

Perilitus robustus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 123.

Meteorus humilis CRESSON, CRESSON, Synops. Hymen. N. Amer., 1887, p. 223.

Meteorus robustus PROVANCHER, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Meteorus orchesiae ASHMEAD, Proc. U. S. Nat. Mus., 1888, p. 643.

Meteorus agilis VIERECK, Trans. Amer. Ent. Soc., vol. 29, 1903, p. 94.

Type.—The types of *humilis* and *agilis* are in the Philadelphia Academy of Sciences; that of *robustus* is in the Museum of Public Instruction, in Quebec; and that of *orchesiae* is in the United States National Museum.

This species is very similar to *terebratus* and *licoriae*, but can be readily separated by the characters given in the key. The length of the ovipositor sheaths will at once distinguish the females; while the more or less roughened and opaque outer faces of the posterior coxae, the length of the malar space, and the relative length of the first and

second abscissae of the radius will separate the males. The radial cell is rather large, extending nearly to apex of wing; the lower abscissa of basella is usually shorter than nervellus and but little more than half the length of upper abscissa of basella; the female antennae are shortened, but little longer than head and thorax united; male antennae extend about to the apex of the abdomen, with 29 to 32 segments; thorax always mostly black; abdomen black, except the connate second and third segments, which are more or less ferruginous.

Distribution.—Illinois, Canada, Michigan, New Mexico, Maryland, Virginia, District of Columbia, New York, Colorado, Oregon. Doubtless the species is generally distributed over the United States and Canada.

Hosts.—*Orchesia castanea* Melsheimer (Ashmead); *Platydemia ellipticum* Fabricius; "scarabaeid larva"; *Tinea oregonella* Busck.

A study of the types of *humilis*, *orchesiae*, and *agilis* has convinced me that they are the same species; and the original description of *robustus*, together with Mr. Gahan's detailed notes, made on an examination of the type, has led me to place this name also in the synonymy of *humilis*. In addition to the types of *humilis*, *orchesiae*, and *agilis*, I have seen the following material: One specimen, apparently from Quebec, Canada, which Mr. Gahan compared with the type of *robustus*; one reared from fungus infested with *Orchesia*, species and *Homosetia*, species by Mr. H. S. Barber, near Plummer Island, Maryland; two specimens reared from *Tinea oregonella* at Parkers Station, Oregon, by P. D. Sergeant, Nov. 17, 1914; one bred from a scarabaeid larva by Dr. T. E. Snyder at Falls Church, Virginia; one reared from *Platydemia ellipticum* at Washington, District of Columbia; and collected specimens from Cusack Ranch and West Cliff, Colorado; Oswego and Spencer Lake, New York; Ottawa and Val Morin, Canada; and Hood River, Oregon.

14. METEORUS ALASKENSIS (Ashmead).

Dyscoletes alaskensis ASHMEAD, Proc. Wash. Acad. Sci., vol. 4, 1902, p. 247.

Type.—In the United States National Museum.

This species is exceedingly like *provancheri*, as noted in the discussion of that species; but for the present it must be held distinct. It is readily separated from *tibialis*, to which it is also very similar, by the characters given in the key.

Popof Island, Alaska.

Host.—Unknown.

That this species is a *Meteorus* was brought to my attention by Mr. S. A. Rohwer, after my departure from the Museum. He has kindly supplied the characters for distinguishing it from *tibialis*.

15. METEORUS TIBIALIS, new species.

Closely resembles *humilis*, but differs in having smoother posterior coxae; in the second abscissa of radius being usually much less than twice as long as first; in the darker posterior tibiae; in the abdomen being usually less strongly petiolate; and in the much longer female antennae.

Female.—Length 4.5 mm. Head transverse, but rather full behind the eyes; face twice as broad as long between base of antennae and clypeus, weakly roughened; malar space nearly as long as basal width of mandibles; eyes moderate to small, very sparsely pubescent; antennae slender, 36-segmented, the first flagellar segment distinctly a little shorter than the second; ocelli small, the ocell-ocular line two and a half times as long as greatest diameter of a lateral ocellus; mesoscutum smooth and shining, with only indistinct punctures; the parapsidal grooves strongly marked, crenulate, meeting in a small rugulose sunken area just in front of posterior margin of mesoscutum; scutellum smooth and shining with some faint punctures; propodeum rugoso-reticulate, with a median longitudinal carina and an irregular transverse carina near base; propleura largely smooth, but more or less crenulate in the depression; mesopleura smooth and shining, with a curved crenulate furrow and a few punctures on lower half, and with a small roughened area beneath anterior wings; metapleura rugulose; entire thorax covered with conspicuous whitish pubescence; anterior wing with a large triangular stigma; second abscissa of radius about one and one-half times as long as first abscissa, and two-thirds as long as second intercubitus; third abscissa of radius going almost to extreme apex of wing; recurrent vein entering first cubital cell near apex; posterior wing with radiellian cell not narrowing apically; nervellus slightly longer than lower abscissa of basella; legs slender; posterior coxae smooth and polished, often weakly punctate outwardly at base; posterior tibiae as long as their trochanters and femora combined; abdomen slender, at least as long as head and thorax combined; first segment two-thirds to three-fourths as long as remainder of abdomen, stouter than is usual in this genus, and not so distinctly divided into a petiole and postpetiole; the entire first tergite, from base to apex, is roughened, largely striate, and is provided with two enormous fossae very near the base; ventral margins of first tergite widely separated; remainder of dorsum of abdomen smooth and polished; ovipositor sheaths slightly longer than the abdomen. Black; head and thorax wholly black, except the clypeus and mandibles, which are mostly reddish, and the antennae, which are pale brown beneath; wings hyaline; stigma dark brown, with a conspicuous pale spot at base; legs reddish testaceous, the anterior pair palest; posterior tibiae brown, pale yellow at base, and

reddish along the upper edge; posterior tarsi brown; abdomen black, except the combined second and third segments, which are reddish testaceous.

Male.—Like the female in all essential characters.

Type.—Cat. No. 25412, U.S.N.M.

Type locality.—Syracuse, New York.

Described from 12 female and 7 male specimens collected by C. J. Drake on *Rhus* in early May. The color of the species varies somewhat from that of the type; some of the paratype specimens have more or less reddish on the apical abdominal segments, and the antennae of some females are almost wholly testaceous, while at least one male has the antennae entirely black. The number of segments in the antennae varies from 33 to 38 in both sexes, in the type series. I have seen another series of 30 specimens, in the Cornell University collection, taken at Montreal, Canada, in May, 1902. These average a little smaller than the Syracuse specimens and the number of segments in the antennae is correspondingly reduced, varying from 31 to 34.

16. *METEORUS TEREBRATUS*, new species.

Distinguished especially by the unusually long ovipositor, which is longer than the entire body. It differs further from *humilis*, to which it is related, by the much longer malar space, and the smooth posterior coxae.

Female.—Length 4.5 mm.; head transverse, but full behind the eyes; face with distinct separate punctures, rather opaque, twice as broad at base of clypeus as long; mandibles nearly as broad at base as the greatest width of clypeus; malar space as long as basal width of mandibles; antennae missing beyond first flagellar segment, which is about as long as scape and pedicel united; ocelli very small, the ocell-ocular line at least two and one-half times as long as greatest diameter of an ocellus; vertex smooth and polished; temples broad, polished; mesoscutum smooth and shining; the lobes well set off by sharp parapsidal furrows; propodeum closely rugose, the longitudinal and transverse carinae not well defined; the dorsal face accordingly not distinctly areolated; propleura finely rugulose; mesopleura mostly smooth with a rugulose area in the upper basal angle and a longitudinal crenulate furrow below; metapleura wholly coarsely rugoso-punctate; wings with stigma large, triangular; recurrent vein entering first cubital cell near first intercubitus; first abscissa of radius about half the second, the second at least half the length of first intercubitus; radial cell large, extending nearly to apex of wing; posterior coxae about as long as their trochanters, smooth and polished; posterior femora relatively smooth; inner spur of hind tibiae less than one-fourth the length of the metatarsus; abdomen slender; first tergite finely striate and provided with two fossae on the petiole

above; remainder of abdomen smooth and polished; ovipositor sheaths about 6 mm. in length, distinctly longer than the entire body. Black; head mostly ferruginous; prothorax ferruginous, brownish above on the sides; rest of thorax black; tegulae testaceous; wings hyaline, stigma brown, pale at base; legs ferruginous, the hind femora at apex, apex of hind tibiae and the hind tarsi more or less infuscated; first abdominal tergite black; second and third tergites ferruginous; beyond, brownish black.

Male.—Thorax not so black as in female, rather brownish black; first abdominal tergite reddish black; malar space longer than basal width of mandibles; inner spur of posterior tibiae nearly a third the length of metatarsus; otherwise agrees with female.

Type.—Cat. No. 24962, U.S.N.M.

Type locality.—Grand Ledge, Michigan.

Host.—Probably *Orchesia castanea* Melsheimer.

Described from one male and one female which were included in Ashmead's type series of *orchesiae*. The female had no red label, but the word "Type" was written in one corner of the name label, in Ashmead's hand; the male bore a red label with the type catalogue number of *orchesiae*.

17. METEORUS HICORIAE, new species.

Closely resembles *humilis* and *terebratus*, but distinguished as noted in the key. It also resembles *tibialis*, agreeing with this species in the stout first abdominal segment; it differs, however, in the shorter ovipositor and the paler legs.

Female.—Length 4 mm. Head transverse, but rather full behind the eyes; face broad, much broader at base of clypeus than long, minutely sculptured; clypeus punctate; malar space less than half as long as basal width of mandibles; antennae much shorter than body, 24-segmented; ocelli very small, the ocell-ocular line at least two and one-half times the greatest diameter of an ocellus; vertex and temples polished; mesoscutum indistinctly punctate, shining; the mesonotal lobes prominent, the parapsidal grooves strongly impressed; propodeum weakly roughened, with a median, two sublateral, and two transverse carinae marking off four areas on the dorsal face; propleura almost entirely smooth, strongly shining; mesopleura smooth and polished, somewhat punctate in the basal upper angle, and with a finely crenulate longitudinal furrow; metapleura mostly smooth and shining; wings with stigma large, triangular; first abscissa of radius shorter than the second, the second less than half the length of the first intercubitus; radial cell long, nearly attaining apex of wing; third abscissa of radius as long as last abscissa of cubitus; recurrent vein not quite interstitial with first intercubitus, entering apical angle of first cubital cell; nervulus a little postfurcal; posterior

coxae small, hardly as long as their trochanters, perfectly smooth, polished; inner spur of posterior tibiae hardly one-third as long as metatarsus; first abdominal segment rather stout, finely longitudinally striate above and provided with two conspicuous fossae anteriorly; ventral margins of first tergite widely separated; remainder of dorsum of abdomen smooth and polished; ovipositor sheaths about two-thirds to three-fourths the length of the abdomen, the ovipositor somewhat curved downward. Black; scape and pedicel of antennae yellow, flagellum pale brown, becoming darker apically; face, clypeus, and mandibles except tips, ferruginous; vertex, occiput, and temples blackish; prothorax entirely ferruginous; rest of thorax black; wings hyaline, stigma dark brown, pale at base; legs, including coxae and femora entirely, yellow; posterior tibiae apically, and posterior tarsi slightly infuscated; abdomen black, except second tergite, which is ferruginous or brownish; ovipositor sheaths brownish.

Type.—Cat. No. 24965, U.S.N.M.

Type locality.—Harrisburg, Pennsylvania.

Host.—Unknown.

Described from three female specimens collected by Mr. W. S. Fisher on *Hicoria*, August 7, 1914. There are three other female specimens, not included in the type series, in the United States National Museum, two were collected by Mr. Fisher at Harrisburg, June 22, 1914; and one labeled "Huron Mts., L. S., 7-9."

18. METEORUS TRACHYNOTUS Viereck.

Meteorus trachynotus VIERECK, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 142.

Meteorus archipsidis VIERECK, Proc. U. S. Nat. Mus., vol. 43, 1912, p. 579.

Type.—Types of both species in the United States National Museum.

Malar space about half as long as basal width of mandibles; ocellular line rarely quite twice as long as greatest diameter of an ocellus; antennae slender, normally with 32 to 34 segments; stigma brown, pale at base; first abscissa of radius usually about equal to second; the third abscissa of radius going to extreme apex of wing; first abdominal tergite finely striate, with two large fossae on petiole, the ventral margins of the tergite widely separated; color varies from mostly black to mostly testaceous. The cocoon is very thin, and milky white in color.

Distribution.—Canada, New York, Pennsylvania, New Jersey, California, Colorado, Utah, Vancouver Island, Louisiana, Massachusetts, New Hampshire, Maine, Florida; probably occurs throughout the United States and at least southern Canada.

Hosts.—*Harmologa fumiferana* Clemens (Viereck); *Cacoecia argyrosipila* Walker (Viereck); *Ancylis comptana* Frölich; *Ancylis*, species; *Ania limbata* Haworth; *Wilsonia*, species.

A study of the types of *trachynotus* and *archipsidis* shows positively that they are the same species. In addition to the types the United States National Museum has the following material: Five specimens reared from *C. argyrosbila* by D. D. Penny, at Watsonville, California; two reared from *Ancylis comptana* by H. B. Scammell, at Whitesburg, New Jersey; one from *Ancylis*, species, by the same collector, at the same locality; one labeled "Mo., Par. *Wilsonia*, 7-15-'87"; one from *Ancylis comptana*, reared by R. W. Doane, in Utah; and collected specimens from Youngstown, New York; Northeast Harbor, Maine, Jacksonville, Florida; Cheyenne Canyon, Colorado; Ottawa and Victoria, Canada. There are in the Cornell collection specimens from Springlake and Little Falls, New York; and Truro, Nova Scotia; in Doctor Brues's collection, one from Chester, Massachusetts, and one from the White Mountains, New Hampshire; and in Mr. Banks's collection one from Pennsylvania.

19. METEORUS TAURICORNIS (Provancher).

Rhopalophorus tauricornis PROVANCHER, Natural. Canad., vol. 12, 1880, p. 168.

Eustalocerus tauricornis Provancher, PROVANCHER, Addit. faun. Canad. Hymen., 1888, p. 378.

Type.—In the Museum of Public Instruction in Quebec.

Head large, full behind the eyes; ocelli very small; petiole of abdomen longer and more slender than is usual in this genus, and not possessing the dorsal fossae; ventral margins of first tergite touching for half the length of the segment; female antennae bright yellow, blackish at apex; male antennae brown. This species has the general appearance and many characters of the group of species typified by *humilis*; but the first tergite differs widely, resembling that of *dimidiatus* more nearly.

Distribution.—Canada, New York, New Hampshire, Massachusetts, Maryland, Virginia, Pennsylvania, Michigan, Iowa.

Host.—Unknown.

The United States National Museum has the following material: A homotype (determined by Gahan), from Oswego, New York; other collected specimens from Cabin Lodge, Maryland (R. M. Fouts); Ithaca, New York; Arlington, Virginia; North East, Pennsylvania, (R. A. Cushman); Agricultural College, Michigan; Ames, Iowa; and Ottawa, Canada. In the Cornell University collection there are specimens from Springlake, Saranac Lake, Slaterville, and Ithaca, New York; and Waubamic, Ontario; Doctor Brues's collection has specimens from Woods Hole and Fall River, Massachusetts; and Flatbush, Long Island; and Mr. Banks has specimens from Falls Church and Glencarlynn, Virginia.

20. METEORUS DIMIDIATUS (Cresson).

Perilitus dimidiatus CRESSON, *Canad. Entom.*, vol. 4, 1872, p. 83.

Meteorus dimidiatus CRESSON, CRESSON, *Synops. Hymen. N. Amer.*, 1887, p. 228.

Meteorus noctivagus VIERECK, *Trans. Kansas Acad. Sci.*, vol. 19, 1905 (1903-1904), p. 281.

Type.—In the Philadelphia Academy of Sciences. The type of *noctivagus* is in the collection of Kansas University.

This species, while rather easily distinguished, has often been confused with related species. Even in his type series Cresson included, as paratypes, a male of *angustipennis* and a female of *communis*, respectively bearing the Nos. 1770.6 and 1770.8. It is most similar to *bakeri*, *autographae*, and *vulgaris*, and these have frequently been determined as *dimidiatus*. From *bakeri* it differs principally as noted in the key. The wings are never clear hyaline as in that species, and the ovipositor sheaths are two-thirds to three-fourths the length of the abdomen. Very often the recurrent vein is interstitial with the first intercubitus; otherwise it enters the second cubital cell at the extreme basal angle, rarely going into this cell as distinctly as is true of *bakeri*; the lower abscissa of basella is almost always distinctly longer than the upper abscissa, and also longer than the nervellus. From *autographae* this species can at once be distinguished by the brown cloud in the stigma, and the shorter antennae; and from *vulgaris* by the brownish stigma and the more slender ovipositor. The eyes are large, and strongly convergent in the female; consequently the face is narrow; ocell-ocular line usually one and one-half to two times the greatest diameter of an ocellus; antennae normally with 27 to 31 segments; propodeum evenly rugose; first abscissa of radius about half as long as the second; first abdominal tergite polished and without fossae on the petiole, finely ruguloso-striate on postpetiole; thorax usually mostly black, although occasionally largely testaceous; first tergite and apex of abdomen normally black.

Distribution.—Material from the following localities has been examined: Numerous points in New Jersey; New York, New Hampshire, Vermont, Maine, Massachusetts, Ohio, Illinois, Virginia, Michigan, Pennsylvania, District of Columbia, Colorado, Utah, California, Washington, Ontario, and Nova Scotia. The type locality of *noctivagus* was Lawrence, Kansas. A common species, widely distributed over the United States and Canada.

Host.—*Desmia funeralis* Hübner. Undoubtedly there are other hosts; but collections that I have seen contain almost no reared specimens. J. F. Strauss¹⁰ reported *dimidiatus* from *D. funeralis*; this is the only good host record published. *Feltia subgothica*

¹⁰ U. S. Dept. Agr. Bull. 419, 1916, pp. 8-9.

Stephens was recorded by Riley and Howard¹¹ as a host; and Strickland¹² discussed the parasitism of *Porosagrotis orthogonia* Morrison by this species. But these records are incorrect; *M. vulgaris* was evidently the species reared in these two cases.

While I have not seen the type of *noctivagus*, I have had no hesitation in placing it in the synonymy of *dimidiatus*. The original description, and the excellent unpublished redescription prepared by Gahan, on a study of the type, conclusively show that *noctivagus* is *dimidiatus*. There is a considerable amount of material of this species in the National Museum, including the specimens reared from *D. funeralis* by Strauss. Many additional specimens, in the collections of Doctor Brues, Mr. Banks, the Boston Society of Natural History, and Cornell University, have been examined.

21. METEORUS BAKERI Cook and Davis.

Meteorus bakeri COOK and DAVIS, Bull. 73, Mich. Agr. Exp. Sta., 1891, p. 9.

Type.—Apparently lost.

Distinguished from *dimidiatus* as noted in the discussion under that species. The antennae normally have 29 to 31 segments; the ovipositor sheaths are about half as long as the abdomen; dorsum of thorax more or less marked with black, the venter always testaceous; abdomen mostly black or blackish, except second and third tergites, which are ferruginous.

Distribution.—Michigan, West Virginia, Kentucky, South Dakota, New York, Massachusetts, Rhode Island, New Hampshire.

Hosts.—*Hyphantria cunea* Drury; *H. textor* Harris.

Although the type seems to have been lost, the good original description, together with the figure and host record accompanying it, leaves no doubt as to the identity of the species. In the National Museum there are three specimens reared from *H. cunea* at French Creek, West Virginia (F. E. Brooks); two reared at Melrose Highlands, Massachusetts, from *Hyphantria*, probably *textor*; one bred from "fall webworm" at Lexington, Kentucky; another reared from the same host at Benton Harbor, Michigan (E. H. Siegler); and collected specimens from Agricultural College, Michigan; Oswego, New York; and South Dakota. At the gypsy-moth parasite laboratory, Melrose Highlands, Massachusetts, there are many specimens reared from the fall webworm collected at Reading Highlands and Beverly, Massachusetts; Putnam, Connecticut; and Westerly and Coventry, Rhode Island.

¹¹ Insect Life, vol. 3, 1890, p. 58.

¹² Canad. Entom., vol. 53, 1921, p. 99.

22. METEORUS AUTOGRAPHAE, new species.

Closely resembles *dimidatus* and *bakeri*, from both of which it differs in the pale yellow stigma and the longer antennae.

Female.—Length, 4.5 mm. Head transverse; face not quite as broad at base of clypeus as long, minutely roughened, shining; malar space very nearly or quite as long as basal width of mandible; antennae very slender, slightly longer than the body, 33-segmented in type, the first flagellar segment more than three times as long as thick and a little longer than second; ocelli small, the ocellular line one and one-half to two times as long as greatest diameter of an ocellus; vertex and temples polished; mesoscutum smooth and polished, with a finely rugulose area behind middle lobe; parapsidal grooves deep, crenulate; scutellum convex, polished; propodeum wholly finely rugulose; the dorsal face of propodeum long, the posterior face short and somewhat hollowed out medially; propleura finely rugulose, crenulate in the depression; mesopleura smooth and polished except for the longitudinal crenulate furrow, and a slightly roughened area beneath base of anterior wing; first abscissa of radius about half the length of the second, the latter nearly as long as second intercubitus; last abscissa of radius reaching wing margin a little before apex of wing; recurrent vein entering second cubital cell near the first intercubitus; radiellian cell not divided, narrowing a little towards apex; nervellus not quite as long as lower abscissa of basella; posterior coxae granular on the outer face; abdomen slender; first segment long, the petiole very narrow; the tergite of first segment polished on the petiole, finely, closely striate on postpetiole, the striae straight; ventral margins of first tergite barely meeting at one point near middle of segment; remainder of abdomen polished; ovipositor sheaths half the length of the abdomen. Ferruginous or testaceous, varied with black; head ferruginous, stemmaticum black; antennae pale, dusky at tips; thorax mostly ferruginous, the metanotum and propodeum brown or blackish; wings hyaline, stigma pale yellow; legs ferruginous, the posterior tarsi weakly infuscated; first abdominal tergite black or brown; remainder of abdomen ferruginous.

Male.—Like the female, except that antennae are 35-segmented, and the occiput, the mesonotal lobes, and the abdomen, except second tergite, are blackish.

Type.—Cat. No. 24968, U.S.N.M.

Type locality.—Norfolk, Virginia.

Described from two female and three male specimens reared by D. E. Fink from *Autographa brassicae* Riley. The species is a solitary parasite. In addition to the type series there is a vast amount of material in the National Museum, both reared and collected. Several large series reared by Mr. R. J. Kewley, at Columbia, South Carolina,

from known parents, on *Laphygma frugiperda* Smith and Abbot and *Cirphis unipuncta* Haworth, are particularly valuable in demonstrating the wide variation in color in the species, even between parents and progeny, and among the progeny themselves. In all cases the progeny are apparently the result of parthenogenetic reproduction. The number of antennal segments in this lot of specimens varies from 32 to 36, a large majority of the individuals having 33 or 34 segments. Other material in the National Collection follows: One specimen reared from *Prodenia eridania* Cramer, at Macclenny, Florida, and two from the same host, at Bartow, Florida (B. L. Boyden); one from *Eurymus eurytheme* Boisduval at Nashville, Tennessee (C. C. Hill); one from *Plathypena scabra* Fabricius, at Charleston, Missouri (E. H. Gibson); one from *Evergestis straminealis* Hübner, Arlington, Virginia; one from *Phlyctaenia ferrugalis* Hübner, on alfalfa, at Clarksdale, Mississippi (W. R. McConnell); one from *Autographa*, "possibly *verruca* Fabricius," Clarksdale, Mississippi (McConnell); and specimens, without host records, from Gainesville, Florida; Washington, District of Columbia; Nashville, Illinois; Louisiana; and Canada. The Cornell collection has one specimen from Ridgewood, New Jersey (M. D. Leonard); and the gypsy-moth parasite laboratory has two specimens, one from Bangor, Maine (A. C. Ward); and one reared from *Alsophila pomataria* Harris, collected at Hampton, New Hampshire. The species is evidently more common over the southern part of the United States, east of the Mississippi, than farther north. It has apparently a wide range of hosts, but shows a distinct preference for noctuid larvae, particularly cutworms.

23. METEORUS VULGARIS (Cresson).

Perilitus vulgaris CRESSON, Canad. Entom., vol. 4, 1872, p. 83.

Meteorus vulgaris CRESSON, CRESSON, Synops. Hymen., N. Amer., 1887, p. 229.

Meteorus coquilletti ASHMEAD, Proc. U. S. Nat. Mus., 1888, p. 642.

Meteorus mellinervis VIERECK, Trans. Amer. Ent. Soc., vol. 29, 1903, p. 95.

Meteorus mamestrae VIERECK, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 364.

Type.—The types of *vulgaris* and *mellinervis* are in the Philadelphia Academy of Sciences; those of *coquilletti* and *mamestrae* are in the United States National Museum.

Easily separated from related species by the characters given in the key. The female antennae normally have 26 to 30 segments, those of the male 29 to 32; the ventral margins of the first tergite touch for a short distance, as shown in figure 2 *f*. The petiole is without dorsal fossae and is smooth and polished; the postpetiole is usually finely striate, smooth and polished between the striae; in some specimens the striae are nearly effaced, the whole first tergite being practically smooth; the ovipositor sheaths are a little more than half the length of the abdomen; the ovipositor is very strongly thickened on the

basal half; in color the species is testaceous, more or less varied with black or brown; the first tergite almost invariably uniformly brown or black.

Distribution.—Evidently this is the most common and most widely distributed of all our species. Without doubt it occurs abundantly in every State of this country, over much of Canada, and in all probability in Mexico.

Hosts.—*Lycophotia margaritosa* Haworth; *L. saucia* Hübner; *Laphygma frugiperda* Smith and Abbot; *Chorizagrotis agrestis* Grote; *Chorizagrotis*, species; *Scotogramma trifolii* Rottemburg; *Paragrotis perexcellens* Grote; *Feltia subgothica* Haworth; *F. annexa* Treitschke; *F. gladiaria* Morrison; *Porosagrotis orthogonia* Morrison; *Eurymus eurytheme* Boisduval; *Agrotis ypsilon* Rottemburg; "cutworms." Material from these hosts, most of it in the United States National Museum, has been examined. The parasite has also been recorded from *Hellula undalis* Fabricius¹³ and *Feltia malefida* Gueneé.¹⁴ An important parasite of the cutworm type of noctuid larva. The species is gregarious, from 8 or 10 to 30 individuals issuing from a single caterpillar. Published host records which are probably incorrect are: *Canarsia hammondi* Riley¹⁵ and *Omphalocera cariosa* Lederer.¹⁶

The foregoing discussion and the characters assigned the species in the key are based on an examination of several hundred specimens from many points in Texas, Delaware, Colorado, California, New Mexico, Arizona, Kansas, Montana, Oregon, Utah, Washington, South Dakota, Louisiana, Alabama, Georgia, Florida, Kentucky, Tennessee, Michigan, Illinois, Indiana, Pennsylvania, Virginia, Maryland, District of Columbia, New York, Vermont, Maine, New Hampshire, Massachusetts, Ontario, Nova Scotia, Alberta, British Columbia. This vast amount of material is in the collections of the United States National Museum; the Philadelphia Academy of Sciences; Cornell University; Doctor Brues, at Harvard University; Mr. Nathan Banks, of the Cambridge Museum of Comparative Zoology; the Boston Society of Natural History; and the gypsy-moth parasite laboratory.

24. METEORUS LAPHYGMÆ Viereck.

Meteorus laphygmae VIERECK, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 560.

Type.—In the United States National Museum.

Very similar to *hyphantriae* and *versicolor*; but a little care in the use of the characters given in the key will separate them; the propleura are entirely rugulose, except along the upper margin; parap-

¹³ Chittenden, Bull. 23, U. S. Dept. Agr., Bur. Ent., 1900, p. 60.

¹⁴ Sanderson, Bull. 57, U. S. Dept. Agr., Bur. Ent., 1906, p. 10.

¹⁵ Ashmead, Proc. Ent. Soc. Wash., vol. 4, 1897, p. 130.

¹⁶ Riley and Howard, Insect Life, vol. 3, 1890, p. 57.

sidal grooves poorly defined; the propodeum is without a petiolarea, being uniformly rugose and usually not separated from the metapleura by a conspicuous raised line; posterior face of propodeum a little hollowed out medially; antennae 30 to 33 segmented; ocell-ocular line in male usually a little longer than diameter of an ocellus, in female normally about equal to the diameter of an ocellus; first tergite polished on the petiole, finely longitudinally striate on the postpetiole, the striae converging rather strongly behind; ovipositor sheaths about half the length of the abdomen; stigma narrower than in *hyphantria*; the first abscissa of radius nearly or quite as long as the second. A uniformly pale yellow species, at most with only weak blackish markings on the postpetiole laterally.

Distribution.—Texas.

Hosts.—*Laphygma frugiperda* Smith and Abbot; *Lycophotia margaritosa* Haworth; *Laphygma exigua* Hübner; *Feltia annexa* Treitschke; *Chloridea obsoleta* Fabricius; *Prodenia*, species; *Monodes*, species; *Eurymus eurytheme* Boisduval. Another general cutworm parasite; it is apparently solitary.

In addition to the types the United States National Museum has many specimens, all reared from the above-named hosts, at Brownsville, Texas, by R. A. Vickery, C. L. Scott, and E. G. Smyth, in the Bureau of Entomology under Webster Nos. 6446, 5738, 6481, 6476, 5740, 5751, 6437, 6455.

25. METEORUS PROXIMUS (Cresson).

Perilitus proximus CRESSON, Canad. Entom., vol. 4, 1872, p. 83.

Meteorus proximus CRESSON, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Meteorus exareolatus VIERECK, Bull. 22, Conn. State Nat. Hist. and Geol. Survey, 1917 (1916), p. 224.

Type.—In the Philadelphia Academy of Sciences; that of *exareolatus* is in the Connecticut Agricultural Experiment Station, at New Haven.

Much care is required to distinguish between this species and *arizonensis*. Antennae in the female 33 to 35 segmented, in the male with 34 to 37 segments; male antennae stout at base, tapering gradually to apex, the flagellum dark brown; face broader at base of clypeus than long, much broader in the male; ocell-ocular line somewhat longer than the diameter of an ocellus; propodeum coarsely evenly rugose, hollowed out behind; radial cell short, radius reaching metacarpus much before apex of wing; intercubital veins more nearly parallel than in *arizonensis*, but this alone is not a dependable character; recurrent vein always entering first cubital cell; lower abscissa of basella about equal to nervellus; first tergite exactly as in *arizonensis*; ovipositor sheaths slightly more than half the length of the abdomen, but distinctly shorter than in *arizonensis*; in color the two

species agree perfectly; wings, in the male, often faintly tinted with brown.

Distribution.—Illinois, Connecticut, New York, Michigan, Massachusetts, Canada.

Host.—Unknown.

The discussion is based on the following material: The types of both *proximus* and *exareolatus*; 8 specimens from Oswego, 2 from Stony Island, and 1 from the Thousand Islands, New York, 1 from Agricultural College, Michigan, and 12 labeled "Cana. C. F. Baker Collection," in the United States National Museum; 2 in the Cornell collection, one of these from Salines, Ontario, the other from Wau-bamic, Ontario (H. S. Parish); 4 in the collection of the Boston Society of Natural History, 2 coming from Brookline, and 2 from Cohasset, Massachusetts; and 2 specimens in Doctor Brues's collection, from Woods Hole and Southbridge, Massachusetts.

26. METEORUS ARIZONENSIS, new species.

Very close to *proximus*, as noted in the discussion of that species, the males being especially difficult to distinguish. However, the differences mentioned in the key and under *proximus* will separate the two species.

Female.—Length, 5 mm. Head transverse; face broader at base of clypeus than long, very minutely sculptured, shining; malar space about as long as basal width of mandible; antennae 30-segmented, the segments shortened; ocell-ocular line distinctly longer than diameter of an ocellus; vertex and temples smooth and polished; mesoscutum shining, parapsidal furrows broad, not deeply impressed; mesonotal lobes very weakly punctate; propodeum evenly coarsely rugose, without prominent carinae, the posterior declivity rather abrupt and distinctly hollowed out medially; stigma rather narrow; radial cell short, the radius reaching metacarpus much before apex of wing; first abscissa of radius much shorter than the second, the latter more than half the length of first intercubitus; recurrent vein practically interstitial with first intercubitus; nervellus distinctly longer than lower abscissa of basella; posterior coxae closely punctate, more or less granular; abdomen stout; first tergite mostly smooth and polished, very finely longitudinally striate laterally on postpetiole, the striae converging strongly behind; remainder of abdomen smooth and polished; ovipositor sheaths at least two-thirds the length of the abdomen. Uniformly ferruginous; antennae ferruginous, slightly infuscated at apex; wings sometimes a little tinted with brownish; legs, including posterior tibiae and tarsi, concolorous with the body.

Male.—Like the female, except that ocelli are usually a little smaller; the malar space longer; the antennae dark brown or black-

ish, except the scape and pedicel beneath; and the body more or less varied with blackish, especially the lateral lobes of mesoscutum, the lateral face of scutellum, propodeum, the postpetiole and posterior coxae. These blackish markings will be found extremely variable, no doubt.

Described from five specimens, from the C. F. Baker collection labeled as follows: Type, allotype, and one paratype, "Ariz. 2551"; one paratype, "Ariz. 1856"; another paratype, "Ariz. 2522." Other material of this species in the United States National Museum, but not included in the type series, consists of one specimen labeled "N. M. 2310, C. F. Baker Collection"; one from Santa Rita Mountains, Arizona (Hubbard and Schwarz); three from Mesilla, New Mexico (Cockerell); and one from Chiric Mountains, Arizona (Hubbard).

27. METEORUS ACRONYCTAE, new species.

Easily distinguished from *euschausia* to which it is closely related, by the shorter antennae; by the incomplete occipital carina; by the first abscissa of radius being as long as, sometimes longer than, the second; the recurrent vein entering second cubital cell; the shorter apical segment of maxillary palpi; the color markings; and the smaller size.

Female.—Length, 4.5 mm. Head transverse, descending abruptly behind the ocelli; temples receding unusually strongly; occipital carina practically effaced for a short distance in the middle; malar space nearly as long as basal width of mandible; last segment of maxillary palpi distinctly shorter than the preceding segment; face as broad at base of clypeus as long, minutely sculptured, shining; antennae 30-segmented; first and second flagellar segments about equal; vertex and temples polished; ocell-ocular line about equal to diameter of an ocellus. Thorax stout, as broad as the head; mesonotal lobes not prominent, somewhat flattened, rather opaque; parapsidal grooves crenulate, not deep; disk of scutellum strongly convex, polished; propodeum rugoso-reticulate, short, the dorsal face unusually short, the posterior face very abrupt and strongly hollowed out medially; pro- and mesopleura mostly smooth and shining; metapleura finely rugulose; recurrent vein entering second cubital cell; first abscissa of radius as long as the second and longer than nervulus; last abscissa of radius a little shorter than last abscissa of cubitus and reaching wing margin much before apex of wing; posterior coxae a little roughened on outer face; abdomen short and stout; first tergite without fossae on the petiole, the postpetiole very finely closely, longitudinally striate, the striae converging strongly behind; ventral margins of first tergite meeting for nearly half the length of the segment; remainder of abdomen smooth and polished; ovipositor sheaths projecting two-thirds the

length of the abdomen. Ferruginous; antennae blackish; except the scape, which is concolorous with face; propodeum black; wings hyaline or subhyaline, stigma pale brown; legs ferruginous, posterior coxae on apical third, apical segment of posterior trochanters beneath, and apex of posterior femora and tibiae, black or blackish; all tarsi more or less infuscated; first tergite black, ferruginous at base; second tergite more or less ferruginous; remainder black.

Male.—Agrees in every way with the female; antennae are 30-segmented as in the type.

Type.—Cat. No. 24969, U. S. N. M.

Type locality.—Hell Canyon, New Mexico.

Described from six female and two male specimens reared by C. Heinrich, October 17, 1916, from a larva of *Acronycta*, species, in the Bureau of Entomology, under Hopkins, U. S. No. 13965j1. Besides the type material the United States National Museum contains a large series labeled *"*Pinus ponderosa*; pars. on *Euschausia*, species, Ariz.," and two other specimens, with no labels whatever, that have cocoons pinned with them; these cocoons are very dark brown, almost black, with a little loose grayish silk. In the collection of Doctor Brues, of Harvard University, I have seen nine additional specimens of this species, from Flagstaff, Arizona. The number of segments in the female antennae, varies from 29 to 30; in the male antennae, from 29 to 31. The blackish markings vary somewhat, but apparently are more constant than usual in the species of this genus.

28. METEORUS VERSICOLOR (Wesmael).

Perilitus versicolor WESMAEL, Nouv. Mém. Acad. Sci. Bruxelles, vol. 9, 1835, p. 43.

Perilitus bimaculatus WESMAEL, Nouv. Mém. Acad. Sci. Bruxelles, vol. 9, 1835, p. 45.

Meteorus versicolor Wesmael, RUTHE, Berlin. Ent. Zeitschr., vol. 6, 1862, p. 45.

Meteorus versicolor, var. *bimaculatus* Wesmael, RUTHE, Berlin. Ent. Zeitschr. vol. 6, 1862, p. 47.

Meteorus decoloratus RUTHE, Berlin Ent. Zeitschr., vol 6, 1862, p. 48.

Meteorus versicolor, var. *decoloratus* Ruthe, SCHMIEDEKNECHT, Illustr. Wochenschr. f. Entom., vol. 2, 1897, p. 298.

Meteorus versicolor Wesmael, MUESEBECK, Journ. Agr. Research, vol. 14, 1918, pp. 201-205.

Type.—Those of *versicolor* and *bimaculatus* are probably in the Brussels Academy of Science; that of *decoloratus* in some German museum.

Very similar to *hyphantriae*, but differs in possessing shorter antennae, which are normally 27 to 30 segmented; and in the recurrent vein always reaching cubitus decidedly before the first intercubitus. The propleura are usually somewhat more regulose; the propectus is impunctate and polished; and the propodeum is usually more evenly rugulose than in *hyphantriae*, with a petiolarea rarely

distinct; in color the species is extremely variable, but is usually honey yellow, more or less varied with black on the propodeum and the abdomen; the first tergite always has the petiole pale, and the postpetiole usually blackish, especially laterally.

Distribution.—Europe; New England States; New Brunswick and Nova Scotia, Canada.

Hosts.—*Euproctis chrysoorrhoea* Linnaeus; *Hemerocampa leucostigma* Smith and Abbot (Muesebeck); *Notolophus antiqua* Linnaeus (Muesebeck). In Europe Schmiedeknecht¹⁷ has recorded this parasite from *Larva v-nigrum* Müller; *Asteroscopus sphinx* Hufnagel; *Bombyx neustria* Linnaeus; *B. lanestris* Linnaeus; *Triphaena pronuba* Linnaeus; *Geometra papilionaria* Linnaeus; *Eupithecia exigua* Hübner; and *Argyresthia nitidella* Fabricius. It is quite probable that some of these records are the result of a misidentification of the parasite.

A large amount of material, both European and North American, reared at the gipsy-moth parasite laboratory, at Melrose Highlands, Massachusetts, furnishes the basis for the above notes. The species was originally introduced into Massachusetts to assist in the control of the brown-tail moth; and at present its distribution on this continent is apparently coextensive with that of its primary host.

29. METEORUS EUSCHAUSIAE, new species.

Closely related to *acronyctae*, and frequently reared from the same collection of larvae. It can readily be separated, however, as pointed out in the description of *acronyctae*.

Female.—Length 5.3 mm. Head transverse; face slightly broader at clypeus than long, finely transversely sculptured; malar space shorter than basal width of mandible; last segment of maxillary palpi distinctly longer than the preceding segment, sometimes much longer; clypeus prominently convex; temples strongly receding; antennae 34-segmented in type; first flagellar segment less than three times as long as thick; vertex and temples polished; ocell-ocular line scarcely longer than diameter of an ocellus; thorax stout; mesonotal lobes finely punctate, shining; rather flat; parapsidal grooves distinct, but not deep; the lateral lobes not meeting posteriorly, separated at apical margin of scutum by a broad, roughened, depressed area; disk of scutellum very prominently elevated; propodeum sloping gradually from base to apex, regularly rugoso-reticulate; propleura punctate, finely crenulate in the depression, shining; mesopleura smooth and shining, very weakly punctate below, without a distinct crenulate furrow; metapleura only weakly punctate, shining; first abscissa of radius about two-thirds the length of the second; last abscissa of radius reaching margin of wing much before

¹⁷ Illus. Wochenschr. Ent., vol. 2, 1897, pp. 221-223.

the apex; recurrent vein usually interstitial with first intercubitus; radiellian cell gradually narrowing toward apex of wing; nervellus nearly twice as long as lower abscissa of basella; posterior coxae coarsely roughened on outer face; abdomen stout beyond first segment; first tergite without fossae on the petiole, finely striate on the postpetiole, the striae converging strongly behind; ventral margins of first tergite joined nearly to the middle of the segment; second and following tergites smooth and polished; ovipositor sheaths one-half the length of the abdomen. Ferruginous; antennae ferruginous at base, blackish on apical half; propodeum blackish; wings hyaline, stigma dark brown behind, pale brown along anterior margin; posterior coxae blackish above at apex; posterior tibiae near base and at apex, and the posterior tarsi, dusky; spurs of posterior tibiae blackish; abdomen ferruginous, except the postpetiole, which is blackish laterally.

Male.—Agrees very well with the female, except as follows: Antennae 35-segmented, the flagellum entirely black or blackish; ocell-ocular line distinctly longer than diameter of an ocellus; and the malar space as long as the basal width of mandible.

Type.—Cat. No. 24970, U.S.N.M.

Type locality.—Cheyenne Mountain, Colorado.

Described from 13 female and 1 male specimens reared from *Euschausia ingens* Hy. Edwards, by G. Hofer, May 27–June 10, 1916. It is evidently a solitary parasite. The cocoons are dark brown covered with a little loose grayish silk. Besides the type series the United States National Museum contains 20 specimens from Mexico; 2 from San Francisco Mountains, Arizona; 4 from Flagstaff, Arizona; and 3 labeled "*Euschausia; Pinus ponderosa; Ariz.*" Doctor Brues's collection has 10 specimens from Flagstaff, Arizona. The female antennae are usually 33-segmented, while those of the males have usually 35 segments. The color characters are relatively very constant in this species.

30. METEORUS DATANAE, new species.

Very similar to *hyphantriae*; but differing from that species in the smoother and broader face, the longer malar space, the usually stouter postpetiole and the slightly shorter ovipositor.

Female.—Length 4.5 mm. Head transverse, temples strongly receding; face a little broader at base of clypeus than long, very minutely roughened; clypeus very prominent; malar space about equal to basal width of mandibles; antennae slender, 34-segmented; ocell-ocular line slightly longer than greatest diameter of a lateral ocellus; mesonotal lobes smooth and shining with only scattering shallow punctures; parapsidal furrows present but not deeply impressed, and terminating in a large ruguloso-reticulate area which

extends to extreme apical border of scutum; scutellum broad at base, strongly convex, with a few minute punctures; propodeum rather evenly ruguloso-reticulate; propleura shining, slightly crenulate in the depression; mesopleura smooth and polished on upper half, finely granularly rugulose in the broad depression on lower half; metapleura opaque, granular or rugulose; wings almost identical with those of *hyphantriae*; first abscissa of radius much shorter than second, but more than half as long; stigma is apparently very slightly narrower and radial cell slightly shorter than in *hyphantriae*; legs slender; posterior coxae more or less roughened above and somewhat punctate on outer face; abdomen about as long as head and thorax united, strongly petiolate; first segment with postpetiole broad, the distance between spiracles more than half the distance from spiracles to apex of segment; postpetiole shining, striate, the striae converging more or less posteriorly; remainder of abdomen smooth and polished; ovipositor sheaths about half as long as abdomen. Ferruginotestaceous; antennae dark brown, flagellum much darker than scape; propodeum with blackish markings basally on either side; postpetiole somewhat dusky laterally; wings hyaline, the stigma more or less brown behind, darker than usual in *hyphantriae*; posterior tibiae yellowish, with a conspicuous blackish annulus near base and the apical fifth black.

Type.—Cat. No. 25413, U.S.N.M.

Type locality.—Somerville, New Jersey.

Hosts.—*Datana integerrima* Grote and Robinson; *D. ministra* Drury; *D. angusii* Grote and Robinson.

Described from five female specimens reared in August, 1921, in the Bureau of Entomology, under gypsy moth laboratory Nos. 11744a5 and 11734a7, by R. T. Webber.

In addition to the type series which has been deposited in the United States National Museum I have seen four other female specimens; one, taken by H. M. Parshley at Orono, Maine, is in the collection of Dr. C. T. Brues, of Harvard University; two are in the collection of the gypsy-moth parasite laboratory, at Melrose Highlands, Massachusetts; one of these was reared from *Datana integerrima* at Reddington, New Jersey, under gypsy moth laboratory No. 11744a3; the other was reared from *D. angusii* taken at South Brunswick, New Jersey, under gypsy moth laboratory No. 12175g1; and one specimen reared from *Datana ministra*, at Overbrook, Pennsylvania, is in the collection of Bureau of Plant Industry at Harrisburg, Pennsylvania.

While it is possible that this is only a form of the variable *hyphantriae*, it is sufficiently constant in the characters in which it differs from that species to warrant holding it distinct, for the present.

31. METEORUS HYPHANTRIAE Riley.

Meteorus hyphantriae RILEY, Rep. Entom. U. S., 1886, p. 532, pl. 10, fig. 4.

Meteorus oecopsidis ASHMEAD, Proc. U. S. Nat. Mus., 1888, p. 642.

Meteorus floridanus ASHMEAD, Proc. U. S. Nat. Mus., 1888, p. 642.

Meteorus relativus VIREECK, Trans. Kansas Acad. Sci. for 1903-04, vol. 19, 1905, p. 280.

Meteorus triangularis MUESEBECK, Canad. Entom., vol. 51, 1919, p. 115.

Type.—The types of *hyphantriae*, *oecopsidis*, *floridanus*, and *triangularis* are in the United States National Museum; that of *relativus* is in the University of Kansas.

Little difficulty should be experienced in determining specimens of this species by means of the foregoing key. However, *hyphantriae* exhibits extreme variability with respect to many characters, and one reared series may differ quite markedly in appearance from another; a close examination of all essential characters will be necessary to identify the two as the same species. The face, especially in the female, is very narrow, and is finely transversely roughened; the malar space is very short in the female, and very rarely in the male is it nearly as long as the basal width of mandible; antennae with 32 to 38 segments, usually with 32 to 35; lateral face of scutellum nearly always with the posterior transverse polished area rather broad; propodeum rugoso-reticulate, a petiolarea usually more or less distinct; recurrent vein usually interstitial with the first intercubitus, occasionally entering the extreme posterior angle of the second cubital cell, very rarely, in the male, going into the first cubital cell; nervellus practically always slightly longer than lower abscissa of basella; the first tergite without fossae on the petiole, and with the postpetiole longitudinally striate, the striae often straight; ovipositor sheaths a little more than half the length of the abdomen. Testaceous, more or less marked with black; antennae nearly always testaceous; propodeum and postpetiole usually blackish; the second tergite usually spotted with black laterally, and the following tergites sometimes more or less blackish.

Distribution.—Widely distributed over the entire United States and Canada.

Hosts.—*Hyphantria cunea* Drury; *H. textor* Harris; *Malacosoma americana* Fabricius (F. M. Webster and J. V. Schaffner); *M. distria* Hübner (H. L. Viereck); *Drasteria erectea* Cramer (S. Blum); *Meliana albilinea* Hübner (C. N. Ainslie); *Euschausia argentata* Packard; *Hemileuca maia* Drury (C. Heinrich); *Palaearctia vernata* Peck (B. A. Porter); *Alsophila pomataria* Harris (B. A. Porter); *Perispasta caeculalis* Zeller; (*Oecopsis*) *Olethreutes*, species (Ashmead); *Hemerocampa leucostigma* Smith and Abbot.

The material from which the above host records were taken is in the United States National Museum, and the gipsy-moth parasite laboratory, with the exception of the type of *relativus*, recorded as a probable parasite of *Malacosoma disstria* by Viereck in his description. Localities represented by this large amount of material include many points in District of Columbia, Missouri, Florida, Massachusetts, North Carolina, Maryland, West Virginia, Indiana, Michigan, New Jersey, Connecticut, Arkansas, New Mexico, Oregon, Nova Scotia. Other specimens, in the collections of Cornell University, the Boston Society of Natural History, of Doctor Brues at Harvard University, and of Mr. Nathan Banks at the Museum of Comparative Zoology, Cambridge, Massachusetts, are from localities in New York, New Hampshire, Maine, Rhode Island, Virginia, California, Quebec.

A careful study of the types of *hyphantriae*, *oecopsidis*, *floridanus*, and *triangularis* has led me to regard all as the same species; and Mr. Gahan's notes on the type of *relativus*, together with the original description, make practically certain the identity of this species with *hyphantriae*. In his description of *relativus* Viereck stated that the antennae were 23-segmented. This was undoubtedly a typographical error. Dr. S. J. Hunter of Kansas University has very kindly had the type examined, and writes me that it has 33-segmented antennae.

SPECIES TRANSFERRED TO THIS GENUS, BUT EITHER UNRECOGNIZABLE, OR BELONGING ELSEWHERE.

METEORUS VITICOLLIS (Holmgren).

Saproctichus vitticollis HOLMGREN, Eugenes Resa Insect., 1868, p. 431.

Meteorus vitticollis Holmgren, SZEPHIGETI, Genera Insectorum, fasc. 22, 1904, p. 180.

Type.—Doubtless in a European collection.

While the original description is extensive many important characters are not discussed, and I have found it impossible to place this species in the key. Quite probably it will fall near *trachynotus*, which it resembles in having the first and second abscissae of radius about equal, in the prominent mesonotal lobes, and to a considerable degree, in color; however, the long malar space would ally it more closely with *terebratus*.

Distribution.—California.

Host.—Unknown.

EPHEDRUS INCOMPLETUS (Provancher).

- Perilitus incompletus* PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 126.
Ephedrus incompletus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 156.
Scotioneurus dives PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 157.
Meteorus incompletus Provancher, CRESSON, Synops. Hymen. N. Amer., 1887,
p. 228.
Ephedrus incompletus Provancher, GAHAN, Bull. 152, Md. Agr. Exp. Sta., 1911,
p. 159.

Type.—In the Museum of Public Instruction in Quebec, Canada.
On an examination of the type of *Perilitus incompletus* Mr. A. B. Gahan, of the Bureau of Entomology, found it to be the same species described by Provancher a little further on in the same volume as *Ephedrus incompletus* and again as *Scotioneurus dives*.

The correct position of this species is included in the present paper at the suggestion of Mr. Gahan.

HOST LIST.

COLEOPTERA.

- Orchesia castanea* Melsheimer..... *Meteorus humilis* (Cresson).
terebratus Muesebeck.
Platydemia ellipticum Fabricius..... *humilis* (Cresson).

LEPIDOPTERA.

- Acrobasis betulella* Hulst..... *Meteorus indagator* (Riley).
caryae Grote..... *indagator* (Riley).
caryivorella Raganot..... *indagator* (Riley).
Acronycta, species..... *acronyctae* Muesebeck.
Agrotis ypsilon Rottemburg..... *vulgaris* (Cresson).
Alsophila pomataria Harris..... *autographae* Muesebeck.
hyphantriae Riley.
Ancylis comptana Frölich..... *trachynotus* Viereck.
Ancylis, species..... *trachynotus* Viereck.
Ania limbata Haworth..... *trachynotus* Viereck.
Autographa brassicae Riley..... *autographae* Muesebeck.
Autographa, species..... *autographae* Muesebeck.
Cacoecia argyrospila Walker..... *trachynotus* Viereck.
Chloridea obsoleta Fabricius..... *laphygmae* Viereck.
Chorizagrotis agrestis Grote..... *vulgaris* (Cresson).
Cirphis unipuncta Haworth..... *communis* (Cresson).
autographae Muesebeck.
Datana angusii Grote and Robinson..... *datanae* Muesebeck.
integerrima Grote and Robinson..... *datanae* Muesebeck.
ministra Drury..... *datanae* Muesebeck.
Desmia funeralis Hübnér..... *dimidiatus* (Cresson).
Dioryctria xanthaenobares Dyar..... *indagator* (Riley).
Drasteria erectea Cramer..... *hyphantriae* Riley.
Euproctis chrysoorhea Linnaeus..... *versicolor* (Wesmael).
Eurymus eurytheme Boisduval..... *autographae* Muesebeck.
laphygmae Viereck.
vulgaris (Cresson).

<i>Euschausia argentata</i> Packard.....	<i>Meteorus hyphantriae</i> Riley.
<i>ingens</i> Hy. Edwards.....	<i>euschausiae</i> Muesebeck.
<i>Euschausia</i> , species.....	<i>acronyctae</i> Muesebeck.
<i>Evergestis straminealis</i> Hübner.....	<i>autographae</i> Muesebeck
<i>Feltia annexa</i> Treitschke.....	<i>laphygmae</i> Viereck.
<i>gladiora</i> Morrison.....	<i>vulgaris</i> (Cresson).
<i>malefida</i> Guenée.....	<i>vulgaris</i> (Cresson).
<i>subgothica</i> Haworth.....	<i>vulgaris</i> (Cresson).
<i>Graptolitha laticinerea</i> Grote.....	<i>communis</i> (Cresson).
<i>Graptolitha</i> , species.....	<i>communis</i> (Cresson).
<i>Hadena procincta</i> Grote.....	<i>hyphantriae</i> Riley.
<i>Harmologa fumiferana</i> Clemens.....	<i>communis</i> (Cresson).
<i>Hellula undalis</i> Fabricius.....	<i>trachynotus</i> Viereck.
<i>Hemerocampa leucostigma</i> Smith and Abbot.....	<i>vulgaris</i> (Cresson).
<i>Hemileuca maia</i> Drury.....	<i>hyphantriae</i> Riley.
<i>Hyphantria cunea</i> Drury.....	<i>versicolor</i> (Wesmael).
<i>textor</i> Harris.....	<i>hyphantriae</i> Riley.
<i>Laphygma exigua</i> Hübner.....	<i>bakeri</i> Cook and Davis.
<i>frugiperda</i> Smith and Abbot.....	<i>hyphantriae</i> Riley.
<i>Loxostege sticticalis</i> Linnaeus.....	<i>bakeri</i> Cook and Davis.
<i>Lycophotia margaritosa</i> Haworth.....	<i>hyphantriae</i> Riley.
<i>sauacia</i> Hübner.....	<i>laphygmae</i> Viereck.
<i>Malacosoma americana</i> Fabricius.....	<i>autographe</i> Muesebeck.
<i>disstria</i> Hübner.....	<i>laphygmae</i> Viereck.
<i>Meliana albilinea</i> Hübner.....	<i>vulgaris</i> (Cresson).
<i>Mineola indiginella</i> Zeller.....	<i>loxostegei</i> Viereck.
<i>juglandis</i> LeBaron.....	<i>laphygmae</i> Viereck.
<i>Monodes</i> , species.....	<i>vulgaris</i> (Cresson).
<i>Notolophus antiqua</i> Linnaeus.....	<i>vulgaris</i> (Cresson).
<i>Olethreutes</i> , species.....	<i>communis</i> (Cresson).
<i>Paleacrita vernata</i> Peck.....	<i>hyphantriae</i> Riley.
<i>Paragrotis perexcellens</i> Grote.....	<i>hyphantriae</i> Riley.
<i>Perispasta caeculalis</i> Zeller.....	<i>vulgaris</i> (Cresson).
<i>Phlyctaenia ferrugalis</i> Hübner.....	<i>hyphantriae</i> Riley.
<i>Platypena scabra</i> Fabricius.....	<i>autographae</i> Muesebeck.
<i>Porosagrotis orthogonia</i> Morrison.....	<i>autographae</i> Muesebeck.
<i>Prodenia eridania</i> Cramer.....	<i>vulgaris</i> (Cresson).
<i>Prodenia</i> , species.....	<i>autographae</i> Muesebeck.
<i>Pyrausta futilalis</i> Lederer.....	<i>laphygmae</i> Viereck.
<i>nubilalis</i> Hübner.....	<i>loxostegei</i> Viereck.
<i>Scotogramma trifolii</i> Rottenburg.....	<i>loxostegei</i> Viereck.
<i>Tetralopha platanella</i> Clemens.....	<i>vulgaris</i> (Cresson).
<i>subcanalis</i> Walker.....	<i>indagator</i> (Riley).
<i>Tinea oregonella</i> Buseck.....	<i>indagator</i> (Riley).
<i>Wilsonia</i> , species.....	<i>humilis</i> (Cresson).
	<i>trachynotus</i> Viereck.

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The following index includes the species of *Meteorus* treated in this paper. Accepted generic names are in bold face, accepted specific names in roman, synonyms in italics.

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