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## CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

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(Paper No. 8.—Continued from p. 210.)

### FAMILY XXX.—Masaridæ.

Prof. Westwood and others confused these wasps with the Vespidae and the Eumenidæ, although Latreille had years previously established his family Masaridæ. Henry de Saussure, in his "Etudes," treats them as a tribe. They, however, represent a distinct family close to the Eumenidæ, but easily separated from them and the Vespidae by the wings not being folded longitudinally, by peculiarities of the antennæ, which are usually strongly clavate at tip; by the wholly different abdomen, the venter being flatter; and by the much larger scutellum.

Of the habits of the Masaridæ nothing seems to be positively known. Some years ago Dr. Dyar gave me specimens of *Masaris vespoides*, Cr., bred from what I take to be the nest of an Odynerine, taken in Arizona.

#### Table of Genera.

1. Front wings with *two* cubital cells (Masarini) . . . . . 3.  
Front wings with *three* cubital cells (Euparagiini) . . . . . 2.
2. Second cubital cell receiving both recurrent nervures; antennæ in ♀ short, clavate, ♂ unknown; scape not long . . . . . (1) Paramasaris, Cameron.  
(Type *P. fuscipennis*, Cam.)
- Second and third cubital cells each receiving a recurrent nervure; antennæ not clavate in both sexes, in ♂ subfiliform; scape very long . . . . . (2) Euparagia, Cresson.  
(Type *E. scutellaris*, Cress.)

3. Labrum extensible..... 8.  
 Labrum *not* extensible.  
 Maxillary palpi wanting or rudimentary, or 3-jointed.....7.  
 Maxillary palpi *not* rudimentary, 4- to 6-jointed; labial palpi  
 4-jointed.....4
4. Maxillary palpi 4-jointed.....5.  
 Maxillary palpi 6-jointed. Labial palpi stout, the last three joints  
 united scarcely as long as the first; claws with a strong tooth  
 beneath; mandibles 3-dentate.....(3) *Paragia* Shuekard.  
 (Type *P. decipiens*, Shuck.)
5. First abdominal segment small; clypeus in ♂ transverse.....6.  
 First abdominal segment nearly as long as the second; clypeus in ♂  
 longer than wide; mandibles obliquely truncate, 3- or 4-den-  
 tate.....(4) *Paraceramius*, Saussure.  
 (Type *P. spiricornis*, Sauss.)
6. Abdominal segments *not* constricted at base; marginal cell *with* an  
 appendage, the second cubital cell about twice as long as  
 wide.....(5) *Ceramius*, Latreille.  
 (Type *C. Fonscolombei*, Latr.)  
 Abdominal segments constricted at base as in the genus *Cerceris*,  
 Latr.; marginal cell *without* an  
 appendage.....(6) *Ceramioides*, Saussure.  
 (Type *C. cerceriformis*, Sauss.)
7. Second cubital cell subquadrate, not or scarcely longer than wide.  
 Labial palpi 4-jointed; labium long; maxillary palpi rudimen-  
 tary, 3-jointed; mandibles rather short and acute; claws  
 unidentate.....(7) *Jujurtha*, Saussure.  
 (Type *Celonites oraniensis*, Lepel.)  
 Labial palpi 3-jointed; labium short, bifid; maxillary palpi  
 wanting; mandibles somewhat acute at apex; claws  
 simple.....(8) *Trimeria*, Saussure.  
 (Type *T. Americana*, Sauss.)
8. Marginal cell *with* an appendage..... 10.  
 Marginal cell *without* an appendage.  
 Eyes in ♂ normal, the lateral ocelli away from the eye margin..9.  
 Eyes in ♂ abnormal, very strongly converging above or holoptic,  
 the lateral ocelli touching the eye margin (♀ unknown).

Scape large, globular, the pedicel annular; flagellum very long, terminating in a large club, joints 1 to 5 elongate, slender, cylindrical, the first joint shorter than either joints 2 or 3.....Masaris, Fabr. (partim).

(?) ♂ *M. Texana*, Cr., (?) g. nov.

9. Scape and pedicel large, globular, nearly equal; first joint of flagellum longer than either 2 or 3; labium long; maxillary palpi rudimentary, 3-jointed; mandibles short and acute; first joint of hind tarsi *not* as long as all the other joints united; claws with a tooth.....(9) *Celonites*, Latreille.  
(Type *Vespa abbreviata*, Villers.)

Scape elongate, the pedicel small; flagellum in ♂ elongate, joints 2 to 6 elongate, cylindrical, subequal, in ♀ short, the first joint as long as 2-4 united, the latter being very short; first joint of hind tarsi elongate, as long as all the following united; claws simple, *without* a tooth.....(10) *Masaris*, Fabricius.  
(Type *M. vespiformis*, Fabr.)

10. Scape not elongate, hardly thrice as long as thick, the pedicel annular; first joint of flagellum in ♀ as long as joints 2-3 united, in ♂ with joints 1 to 4 elongate; first joint of hind tarsi a little longer than all the following joints united, the second and third only a little longer than thick; claws long, simple.....(11) *Pseudomasaris*, Ashmead, g. nov.  
(Type *Masaris occidentalis*, Cress.)

Scape elongate, about four times as long as thick, the pedicel hardly longer than thick; first joint of flagellum in ♀ not longer than 2-3 united; first joint of hind tarsi shorter than all the following joints united; claws very small... ..(12) *Quartinia*, Gribodo.  
(Type *Q. dilecta*, Gribodo.)

#### FAMILY XXXI.—Chrysididae.

1825. *Chrysid*, Cinquieme Tribe, Latreille. Fam. Nat. Regn Anim., p. 448.  
1830. *Chrysid*, Tribe VIII., Leach. Edinb. Ency., IX., p. 146.  
1839. *Chrysidæ*, Fam. 18, Haliday. Hym. Syn., p. ii.  
1845. *Chrysidiformes*, Dahlbom. Hym. Enc., II., p. 2.  
1877. *Chrysostilba*, Tribe 13, Förster. Ueber d. Syst. Werth d. Flügelg. bei den Hym., p. 20

Abroad, the wasps belonging to this family are known as "ruby-tailed flies" and "gold-wasps."

Cuckoo wasps is a better name for them. They are among the handsomest of all wasps, being most frequently of a brilliant metallic green, blue-green, blue, purplish or cupreous; they are rarely wholly black, and still more rarely variegated with yellow or testaceous.

All the species are parasitic or inquilinous, principally in the nests of bees and wasps. The potter-wasps (*Eumenidae*) and the leaf-cutting bees (*Megachilidae*, subfamily *Osmiinae*) are especially subject to their attacks; they have also been bred from the nests of other bees and wasps, and a few are said to have been bred from the larvae of sawflies (*Tenthredinoidea*).

Dahlbom was among the first to separate the family into groups, which he called families. He established six families: (1) *Cleptidae*, (2) *Elampidae*, (3) *Hedychridae*, (4) *Chrysididae*, (5) *Euchraidae*, and (6) *Parnopidae*. All of these, except the *Euchraidae*, are natural groups, recognized to-day as subfamilies, and he, and not Aaron and Mocsary, should receive credit for first pointing them out.

In 1889 an excellent monograph of this family, entitled "Monographia Chrysidarum orbis terrarum universi," was published by Alexander Mocsary, at Buda-Pesth, Hungary. It is a large 4to, of 643 pages, illustrated with two plates, gives a full bibliography of the family, tables for recognizing the subfamilies and genera, and terminates with a list of the hosts from which these wasps have been bred. It is the best work ever published on the family, and will be found indispensable to the student.

Mocsary, in this work, recognized seven subfamilies: (1) *Amiseginae*, (2) *Cleptinae*, (3) *Allovelinae*, (4) *Ellampinae*, (5) *Hedychrinae*, (6) *Chrysidinae*, and (7) *Parnopinae*.

In 1890, after this work had been published, Mocsary established another subfamily, the *Adelphinae*, based upon a Mexican genus, *Adelpha*, placing it next to the *Amiseginae*. In my opinion this subfamily does not represent a natural group, and I have here merged it with the *Cleptinae*.

It will also be observed that I have not followed Mocsary in his arrangement of the subfamilies. My reasons for this are simple. I believe the family *Chrysididae*, through the *Cleptinae* and the *Amiseginae*, is quite closely allied to the family *Bethylidae*, and by the arrangement here proposed, a very natural transition into this family is shown. The *Parnopinae*, although very far removed, appear to me to approach nearest

to the *Masaridae* and the *Eumenidae*, and hence I begin with them, rather than with the *Amiseginae*, as Mocsary has done.

This paper was ready for publication when I received the July No. of *Zeitschr. f. Hym. n. Dipt.*, in which Mr. Adolphe Ducke has established a new subfamily, the *Pseudopyrinae*, based upon a new genus discovered in Brazil.

This subfamily, judging from the description alone, is hardly justifiable, all the characters given, except those of the abdomen, agreeing with the *Allocoelinae*, and I have here merged it with that subfamily.

#### Table of Subfamilies.

- Face more or less convex, never concave; prothorax quadrate, subtrapezoidal or longer than wide, and as long or longer than the mesonotum; abdomen depressed, subconvex or convex beneath, the female with 2 or 4 dorsal segments, the male with 4 or 5 segments. . . . . 3.
- Face more or less concave; prothorax transverse quadrate or rectangular, shorter than the mesonotum; abdomen concave beneath, with 3 dorsal segments, rarely with 4 segments in some males.
- Maxillæ and labium normal, the ligula subconical, the galea rounded, obtuse. . . . . 2.
- Maxillæ and labium abnormal, the ligula and galea very long, produced into a slender, filiform beak, resembling the proboscis of bees, and bent back under the thorax in repose; front wings with the discoidal cell distinct; abdomen in ♀ with 3, in ♂ with 4 segments, the last *without* pits or foveolæ, but with a broad deep submarginal furrow on each side of the apical half; apex of abdomen irregularly denticulate. . . . . Subfamily I.—Parnopinae
2. Third abdominal *with* a submarginal series of pits or foveolæ, contained in a groove or declivity, the apical margin rarely unarmed, most frequently angulate, dentate or serrate; front wings with a distinct discoidal cell; claws simple. . . Subfamily II.—Chrysidinae.
- Third abdominal segment *without* a submarginal series of pits or foveolæ in a groove or declivity, the surface therefore entire, smooth; front wings with the discoidal cell frequently wanting or incomplete; claws bifid, serrate or pectinate.

- Front wings with the first and second discoidal cells usually more or less present and complete, or at least indicated by fuscous lines; apical margin of the last dorsal segment entire, very rarely undulate or more or less angulate laterally. . . . . Subfamily III.—Hedychrinæ.
- Front wings with the first and second discoidal cells wanting, rarely with the second indicated by water lines; apical margin of the last dorsal segment medially excised or truncate—emarginate, rarely entire or subsinuate, scarcely excisely (*Philoctetes*) . . . . . Subfamily IV.—Elampinæ.
3. Metathorax unarmed, the hind angles rounded. . . . . 4.
- Metathorax with the hind angles acute or toothed; pronotum usually longer than wide, narrowed anteriorly, rarely quadrate.
- Pronotum *without* a transverse furrow anteriorly; abdomen in ♀ with 2 or 3 dorsal segments, the apical margin of the last rounded, edentate; claws with one tooth beneath. . . . . Subfamily V.—Allocoelinæ.
- Pronotum *with* a transverse furrow anteriorly; abdomen in ♀ with 4 dorsal segments, in ♂ with 5 segments. . . . . Subfamily VI.—Cleptinæ.
4. Pronotum broad, quadrate or subtrapezoidal, usually as long as the mesonotum, rarely a little shorter; abdomen much depressed, the known forms with 4 or 5 distinct dorsal segments. . . . . Subfamily VII.—Amiseginæ.

#### SUBFAMILY I.—Parnopinæ.

The abnormally lengthened labium and maxillæ, as well as the venation of front wings and the peculiarities of the abdomen, render the subfamily easily recognized.

It is represented at present by a single genus, and all of the species apparently confine their attacks to wasps belonging to the family *Bombicidæ*.

Abdomen in ♀ with 3 segments, in ♂ with 4 segments, the terminal segment minutely denticulate at apex; postscutellum lamelliform, projecting; labium and maxillæ abnormally long . . . . . Parnopes, Latreille.  
(Type *Chrysis grandior*, Pallas.)

#### SUBFAMILY II.—Chrysidinæ.

This is the largest and most extensive group in the family. It is easily recognized by the simple, edentate claws, by the front wings having

a distinct discoidal cell, and by the abdomen, which is composed of only 3 visible segments, the third segment always having a groove or declivity before its apex, which is filled with pits or foveolæ, the margin being usually dentate or serrate, rarely simple or unarmed.

The wasps of this subfamily attack principally bees belonging to the families *Anthophoridae*, *Megachilidae*, *Andrenidae* and *Panurgidae*, and wasps of the family *Eumenidae*; they also attack those of the families *Pemphredonidae*, *Philanthidae*, *Larridae*, *Sphecidae* and *Scoliidae*.

*Chryaspis*, Saussure, described from Africa, I do not know, nor can I find out where it is described, the Zoological Record, and Dalla Torre, in his catalogue, being deficient in citing the publication. Both give Soc. Entom., II., 1887, p. 25. What entomological society?

#### Table of Genera.

- Head normal, not rostriform; postscutellum normal, the basal part *not* covered by the scutellum..... 2.
- Head rostriform, the frons narrowed; postscutellum conically produced, the basal part wholly covered by the scutellum.
- Postscutellar process excavated; third joint of antennæ *longer* than the fourth..... (1) *Stilbum*, Spinola.  
(Type *Chrysis cyanura*, Forster.)
- Postscutellar process not excavated, convex; third joint of antennæ usually distinctly *shorter* than the fourth..... (2) *Pyria*, Lepeletier.  
(Type *Chrysis lyncea*, Fabr.)
2. Apical margin of the third dorsal abdominal segment normal, or *without* a pellucid or subcoriaceous membrane..... 3.
- Apical margin of the third dorsal abdominal segment abnormal, composed of a pellucid or subcoriaceous membrane..... (3) *Spintharis*, Klug.  
(Type *S. chrysonota* (Klug), Dahlb.)
3. Front wings *with* a complete discoidal cell..... 4.
- Front wings *without* a complete discoidal cell..... 8.
4. Antennæ, legs and tibial spurs normal..... 5.
- Antennæ, legs and tibial spurs abnormal.
- Apical margin of the third abdominal segment 6-dentate; antennæ with the joints of the flagellum dilated..... (4) *Pleurocera*, Guerin.  
(Type *P. viridis*, Guerin.)

5. Apical margin of third abdominal segment *not* finely denticulate, entire, notched, or terminating in from one to seven teeth. . . . . 6.  
 Apical margin of third abdominal segment finely denticulate or with many teeth.  
 Front wings with an *incomplete* marginal cell.  
 Mesopleura bispinose . . . . . (5) *Euchroëus*, Latreille.  
 (Type *Chrysis purpurata*, Fabr.)  
 Mesopleura normal, unarmed. . . . . Spinola, Dahlbom.  
 Front wings with a complete marginal cell.  
 Apex of abdomen with 11 small  
 teeth . . . . . (6) *Polydontus*, Radoszkowski.  
 (Type *P. Stschurovskyi*, Radosz.)
6. Apex of abdomen not terminating in a tooth, entire, undulate, notched or angulate . . . . . 7.  
 Apex of abdomen terminating in from one to seven teeth.  
 Apical margin of third abdominal segment terminating in 7  
 teeth. . . . . (7) *Heptachrysis*, Mocsary.  
 (Type *Chrysis festina*, Smith.)  
 Apical margin of third abdominal segment terminating in 6  
 teeth . . . . . (8) *Chrysis*, Linné.  
 (= *Hexachrysis*, Licht.)  
 (Type *Chrysis ignita*, Linné.)  
 Apical margin of third abdominal segment terminating in 5  
 teeth . . . . . (9) *Pentachrysis*, Lichtenstein.  
 (Type *Chrysis amœna*, Eversm.)  
 Apical margin of third abdominal segment terminating in 4  
 teeth . . . . . (10) *Tetrachrysis*, Lichtenstein.  
 (Type *Chrysis aeruynosa*, Dahlb.)  
 Apical margin of third abdominal segment terminating in 3  
 teeth . . . . . (11) *Trichrysis*, Lichtenstein.  
 (Type *Chrysis cyanea*, L.)  
 Apical margin of third abdominal segment terminating in 2  
 teeth . . . . . (12) *Dichrysis*, Lichtenstein.  
 Apical margin of third abdominal segment terminating in a  
 single central tooth . . . . . (13) *Monochrysis*, Lichtenstein.  
 (Type *Chrysis hybrida*, Lepel.)



7. Apical margin of third abdominal segment undulate, notched or angulate. . . . . (14) *Gonochrysis*, Lichtenstein.  
(Type *Chrysis albipennis*, Klug.)
- Apical margin of third abdominal segment  
entire. . . . . (15) *Olochrysis*, Lichtenstein.  
(Type *Chrysis aerata*, Dahlb.)
8. Body narrow, slender. . . . . (16) *Chrysogona*, Förster.  
(Type *C. gracillima*, Förster.)

## SUBFAMILY III.—Hedychrinae.

This group is closely allied to the *Elampinae*, where Aaron placed it, and probably the slight difference in venation used by Mocsary will not always prove satisfactory. The characters of the claws given by Dahlbom are entirely worthless to separate these wasps from the *Elampinae*.

The third abdominal segment is always normal, *without* a groove or declivity filled with a submarginal series of pits or foveolæ, and this character separates the group from the *Chrysidinae*; while from the *Elampinae* it is usually easily distinguished by the venation of the front wings, the first and second discoidal cells being usually distinct, complete.

The wasps of this subfamily are most frequently bred from the nests of the *Pemphredonidae* and *Trypoxylidae*, although they attack other wasps, *Philanthidae*, *Stizidae*, and *Sphecidae*. A few are also recorded from bees, *Megachilidae*, *Andrenidae*, *Panurgidae*, etc.

## Table of Genera.

1. Submedian cell *not* longer than the median, the transverse median nervure interstitial with the basal nervure. . . . . 2.  
Submedian cell longer than the median, the transverse median nervure originating beyond the basal nervure.
- Claws with 4 or more teeth beneath; first and second discoidal cells distinct or indicated by fuscous nervures. . . . . (1) *Holopyga*, Dahlbom.  
(Type *H. amœnula*, Dahlb.)
2. Claws with one small tooth beneath, at or near the middle; abdomen with the third segment at apex entire or broadly sinuate. . . . . (2) *Hedychridium*, Abeille.  
(Type *Chrysis ardens* (Latreille), Coquebert.)

Claws cleft or bifid; abdomen with the third segment laterally rather strongly sinuate, and appearing more or less distinctly angulate .....(3) *Hedychrum*, Latreille.  
(Type *Sphex nobilis*, Scopoli.)

## SUBFAMILY IV.—Elampinae.

This group could only be confused with the *Hedychrinae*, the only available character to separate it from that group, and probably not a reliable character, being the apparent absence of discoidal cells in the front wings. I have examined many specimens, and in nearly all I can clearly detect these cells by hyaline veins, when examined through a bright light.

## Table of Genera.

- Postscutellum seen from the side gibbous, convex, subconvex or obtusely produced, rarely subconical..... 2.
- Postscutellum seen from the side acuminately produced into a depressed blade or ledge.
- Front femora towards base rectangularly dilated; abdomen with the third segment at apex medially most frequently strongly narrowed, reflexed and truncate; claws with 3-6 teeth.....(1) *Notozus*, Förster.  
(Type *Hedychrum spina*, Lepel.)
2. Posterior tibiae normal..... 3.
- Posterior tibiae in ♂ dilated, compressed.
- Abdomen with the third segment at apex undulate or rounded centrally, almost entire, very slightly sinuate, scarcely incised; pronotum declivous before; claws with 3 teeth.....(2) *Philoctetes*, Abeille.  
(Type *Elampus micans*, Klug.)
3. Abdomen with the third segment at apex medially *not* truncate, and, viewed laterally, not forming a snout-like projection..... 4.
- Abdomen with the third segment at apex medially truncate, and, as viewed laterally, forming a snout-like projection that appears truncate; seen from behind, it is usually incised or emarginate below.
- Surface of the third segment, just above the snout-like projection, produced into a cone-shaped piece forming the direct apex of

- a fold which extends on each side just above the apical and lateral margins ; claws with 2-3 teeth  
within . . . . . (3) *Diplorrhos*, Aaron.  
(Type *D. plicatus*, Aaron.)
- Surface of the third segment above the snout-like projection even, *not* produced ; claws with two or more teeth ; pronotum nearly regularly convex . . . . . (4) *Elampus*, Spinola.  
(Type *Sphex auratus*, Linné.)
4. Abdomen with the third segment at apex medially more or less distinctly excised ; claws with 3-8 teeth beneath . . . . . (5) *Pseudomalus*, Ashm., g. nov.  
(Type *Omalus semicircularis*, Aaron.)
- Abdomen with the third segment at apex rounded, entire ; claws with 3 teeth beneath . . . . . (6) *Holophris*, Mocsary.  
(Type *H. marginellus*, Mocs.)

SUBFAMILY V.—*Alloceolinae*.

This subfamily was established by Mocsary. It is allied to the *Cleptinae*, but is easily distinguished by the absence of a transverse furrow on the pronotum, by the paucity of visible segments in the abdomen, there being only two or three, and by the claws, which are armed with a tooth beneath.

Ducke's recently-established subfamily *Pseudepyrinae* seems to fall in here.

In the character of the pronotum, the group shows some affinity with the *Amiseginae*, but from that group it is easily separated by the unidentate claws, the armed metathorax, and by the totally different shaped abdomen.

## Table of Genera.

- Pronotum twice wider than long ; abdomen with three segments, the last with a finely elevated apical margin . . (1) *Pseudepyris*, Ducke.  
(Type *P. paradoxa*, Ducke.)
- Pronotum longer than wide, trapezoidal ; abdomen with only two visible segments, the last with the apical margin rounded, edentate . . . . . (2) *Allocelesia*, Mocsary.  
(Type *Anthracia capensis*, Smith.)

## SUBFAMILY VI.—Cleptinæ.

The acute or toothed hind angles of the metathorax separate this subfamily from the *Amiseginæ*, while from the *Allocelinae*, to which it is most closely allied, it is separated by the pronotal differences, the pronotum in this group always being divided by a transverse furrow anteriorly.

In venation the group is practically identical with many forms in the family *Bethylidae*, and this resemblance is so striking that quite recently an eminent French hymenopterist classified *Heterocelid*, Dahlbom, with the *Bethylidae*.

All the species bred are recorded from the larvæ of sawflies (*Nematidae*).

## Table of Genera.

- Front wings with the first and second discoidal cells *distinct*, complete..... 2.
- Front wings with the first and second discoidal cells *wanting* or incomplete..... 3.
2. Eyes large, oval; antennæ *not* inserted on a tubercle; clypeus without a prominent carina; scutum of metathorax visible..... (1) *Cleptes*, Latreille.  
(Type *Sphex semiaurata*, Linné.)
- Eyes small, rounded; antennæ inserted on a small tubercle; clypeus with a strong prominent carina its entire length; scutum of metathorax wanting..... (2) *Heterocœlia*, Dahlbom.
3. Pronotum quadrate, with a transverse arcuate furrow anteriorly; claws with a median tooth beneath..... (3) *Adelphe*, Mocsary.  
(Type *A. mexicana*, Mocsary.)

## SUBFAMILY VII.—Amiseginæ.

This small group is known at once by the metathorax being unarmed, the hind angles being always rounded, never acute. The pronotum is broad, quadrate, or nearly, usually wider than long, and as long as the mesonotum or a little shorter. The abdomen is much depressed, oval, the known forms having 4 or 5 distinct dorsal segments.

The species can be easily confused with genuine *Bethylids*, and the connection between these insects and the family *Bethylidae* is very close.

## Table of Genera.

Front wings with two discoidal cells, or at least these are indicated by fuscous streaks; antennæ 13-jointed.

Pronotum as long or a little longer than the mesonotum, the latter without parapsidal furrows, but with a grooved line at sides just above the tegulæ; abdomen with 5 visible dorsal segments; marginal cell open at apex; discoidal cells usually incomplete, indicated by fuscous streaks. . . . . (1) *Mesitiopterus*, Ashmead, n. g.

(Type *M. KahlII*, Ashm.)

Pronotum shorter than the mesonotum, the latter with parapsidal furrows; abdomen with 4 visible segments; marginal cell closed; discoidal cells distinct. . . . (2) *Amisega*, Cameron.

(Type *A. cuprifrons*, Cam.)

*Mesitiopterus KahlII*, n. sp.

♂.—Length 3 mm. Head and thorax bronzed green, punctate, the metanotum smooth, with a median carina; scape, pedicel and legs, except the middle and hind coxæ, rufous; abdomen black, the first segment at apex and the large second segment, except at apex, minutely punctate. Wings hyaline, the subcostal vein and the stigma brown-black, the other veins testaceous; the venation is as in the Bethyloid genus *Mesitius*, Spinola, and is also much as in *Cleptes*, Latr.; there are two indistinct discoidal cells represented by slight fuscous streaks.

Type.—Cat. No. 6343, U. S. N. M (Ashmead collection).

Hab.—Kansas, Lawrence. Taken by Mr. Hugo Kahl, July 7, 1896.

*Mesitiopterus Townsendi*, n. sp.

♂.—Length 2 mm. Head and thorax aeneous black, punctate; scape of antennæ obclavate, aeneous black, the flagellum dull black; tips of front and middle tibiæ and their tarsi, except at apex, testaceous, the hind tarsi fuscous, testaceous basally and beneath. Abdomen aeneous black, punctured very nearly as in *M. KahlII*. Wings subhyaline, hyaline basally, the venation as in previous species.

Type.—Cat. No. 6344, U. S. N. M (Ashmead collection).

Hab.—Mexico, San Rafael, Jicoltepec (Prof. Tyler Townsend).

ON THE TYPE OF THE GENUS *COCCUS*, L.

BY MRS. C. H. FERNALD, AMHERST, MASS.

The first attempt to separate the species given under *Coccus* in the 10th edition of the *Systema Naturæ* of Linneus, was made by Geoffroy, in his *Histoire Abregée des Insectes*, Vol. I. (1762), where he placed a part of them under *Chermes* and left *adonidum* and *phalaridis*, with his new species *ulmi*, under *Coccus*. Of these species only *phalaridis* was given under the genus *Coccus* by Linneus in his 10th edition, and is therefore the only species that could be regarded as the type of *Coccus* so far as Geoffroy is concerned.

In 1802, Latreille, in Vol. III., p. 267, of his *Hist. Nat. Crust. Ins.*, established *hesperidum* as the type of the genus *Coccus*. I have not been able to find that any of the writers between the appearance of the work of Geoffroy and that of Latreille published anything that would fix the type of *Coccus*. Leach in 1815 and Samouelle in 1819 adopted *cacti* as the type, but the statement made by Leach that it "inhabits fruit trees" makes it quite certain that he had under consideration neither *cacti*, L., nor the cochineal insect. Samouelle merely copies Leach. Curtis, in his *British Entomology* (1838), gives *cacti*, L., as the type, but none of these three authors could affect the question, as the type had already been established by Latreille, if not by Geoffroy, as shown above.

The *phalaridis* of Linneus was so obscure an insect that the author himself could not determine whether it was a *Coccus*, an *Aphis* or a *Chermes*. Fonscolombe, in describing his *Coccus radicum graminis* (*Ann. Soc. Ent. Fr.* III., 212, 1834), gave the synonymy as follows: *Phalaridis* (?), Linn., Fab., non *C. phalaridis*, Enc. Meth. nec Geoffr. Prof. Cockerell has suggested the idea that the *phalaridis* of Geoffroy was possibly not the same species as the Linnean insect, which is precisely the same idea that Fonscolombe had, as shown by his synonymy. Since it is probably impossible to prove that Geoffroy had any of the Linnean species of the 10th edition in his restricted genus, the only safe ground will be to adopt the type established by Latreille in 1802, at least till further light is obtained on the identity of *phalaridis*, L., which at present is unknown.

If, therefore, we adopt *hesperidum* as the type of *Coccus*, the genera *Calymnatus* and *Calypticus* of Costa and *Lecanium* of Burmeister will fall

as synonyms of *Coccus*, and a new subfamily name will have to be substituted for *Lecaniinae* and also for the subfamily now called *Coccinae*.

The species *cacti*, L., as has been shown by Prof. Cockerell, is a *Monophlebus* and must be known by the name of *Monophlebus cacti*, L. This insect, so far as can be learned from the writings of those who are known to have had this species before them for study, does not possess colouring matter. When Fabricius and others simply copy the description of Linneus without changing it in any way we must consider it as pertaining to the Linnean species only, but when they add to that description the word "tinctorium," as Fabricius does in some of his later writings, we must conclude that he has confounded the cochineal insect with the Linnean species which has the following synonymy:

*Coccus cacti*, Linn., Syst. Nat., Ed. X., Vol. I., p. 457 (1758).

*Coccus cacti*, Linn., Syst. Nat., Ed. XII., Vol. I., p. 742 (1766).

*Coccus cacti*, Fab., Syst. Ent., p. 744 (1775).

*Coccus cacti*, DeGeer, Ins. Vol. 6, p. 447 (1776).

*Coccus cacti*, Fab., Spec. Ins., Vol. II., p. 395 (1781) in part.

*Coccus cacti*, Gmel., Syst. Nat., Ed. XIII., Vol. I., part IV., p. 2220 (1788-93) in part.

*Coccus cacti*, Fab., Ent. Syst., Vol. IV., p. 227 (1794) in part.

*Coccus cacti*, Fab., Syst. Rhyng., p. 311 (1803) in part.

*Monophlebus cacti*, Ckll., Science, n. ser., Vol. XV., p. 718 (1902).

The cochineal insect, so long confounded with *cacti*, L., was called by the specific name of *cacti* through a misapprehension, from the time of Fabricius till Costa, in his Fauna del Regno di Napoli, Emmitteri, described the species under the name of *Dactylopius coccus*, in such a manner that there can be no doubt that he was dealing with the cochineal insect. In 1833 Brandt described it very fully, with excellent illustrations, under the name of *Coccus cacti*, and, while he supposed he had the Linnean species, his description and illustrations apply only to the cochineal insect. The synonymy of this insect is too extensive to be given here, but will appear in my Catalogue of the Coccidæ soon to be published.

The leading facts in this paper were prepared at my request by my husband, Prof. C. H. Fernald, in reply to questions from Prof. Cockerell, who requested him to publish the results of his investigations on the subject, but as Mr. Fernald does not wish to publish on the Coccidæ, he has turned the matter over to me to prepare for publication.

## NOTES AND DESCRIPTIONS OF BEES.

BY J. C. CRAWFORD, JR., WEST POINT, NEBR.

The specimens on which this paper is based are in the collection of the University of Nebraska, unless otherwise stated. Especial acknowledgments are due to Prof. Cockerell for specimens and suggestions, to Prof. Titus for specimens, and to Prof. Bruner for overseeing my work.

*Halictus montanus*, n. sp.—Female: Black, head closely coarsely and deeply punctured on the vertex, coarser along the inner orbits, less closely on the face below the antennæ; clypeus sparsely and more coarsely punctured, fringed with golden hair at the apex; mandibles black, reddish at tips; antennæ black, flagellum dark brownish beneath towards tip; pubescence of head and thorax griseous, slightly tinged with ochraceous on the thorax, thin on the disc of mesothorax, dense on pleura and cheeks; thorax closely and rather coarsely punctured; base of metathorax enclosed and finely rugose, truncation finely roughened and with large punctures; tegulae large, testaceous, and with punctures anteriorly; wings slightly yellowish, clouded apically; nervures and stigma bright testaceous; legs black, tarsi and hind tibiae behind ferruginous; pubescence of legs slightly ochraceous, on inner side of tarsi and hind tibiae golden; inner hind tibial spur with many short blunt teeth; abdomen black, very finely punctured, apical margins of segments with yellowish-white hair bands, bases of segments 2-4 also showing slight hair bands; pubescence at base of first segment griseous, on discs of other segments black, not showing plainly except from the sides. Length, 12-14 mm.

Male.—Similar to the female, but with the usual narrow form of the male. Most of mandibles and labrum and anterior half of clypeus yellowish-white, that on the clypeus produced to a tooth medially at rear; femora black, front and intermediate ones with a whitish stripe anteriorly, and all knees whitish; tibiae yellowish white, with black stripes in front and behind; tarsi yellowish-white, apical joints tinged with reddish; antennæ long, reaching the metathorax, black, dull brownish beneath. In pubescence and punctuation like the female, the punctuation much closer, however. Length, about 12 mm.

Twelve female specimens: Big Horn Mts., Wyo.; Sioux Co., Nebr.; Logan, Utah; Laramie, Wyo.; Wawawai, Wash. (R. W. Doane, coll.); Wawawai, Yakima, and Almota, Wash. (C. V. Piper, coll.).



Ten male specimens: Wawawai, Wash (C. V. Piper, coll.); East Wash.

*Halictus Titusi*, n. sp.—♀. Black, head shining, vertex, clypeus and supraclypeal space with sparse and large punctures; sides of face with close, large, oblique punctures or depressions; mandibles black; antennæ dark, flagellum slightly brownish; head with sparse long pubescence, on cheeks and vertex slightly tinged with ochraceous; mesothorax with a bluish reflection, smooth with sparse large shallow punctures, scutellum with similar but smaller punctures; tegulæ large, shining, punctured, dark, with a lighter centre and broad testaceous margin; base of metathorax enclosed, closely, rather finely, longitudinally striate; wings hyaline, tinged with yellowish; nervures and stigma testaceous; thorax with long griseous hair slightly tinged with ochraceous; legs black, apical joints of tarsi ferruginous; pubescence of legs slightly ochraceous; of tarsi decidedly so; inner spur of hind tibiæ with many short blunt teeth; abdomen dull, smooth, with a very few shallow punctures, almost imperceptible; apical half of segments depressed; basal margins of segments 2-4 with a broad thin band of appressed white pubescence; last segment almost covered with this pubescence. Length, about 10 mm.

Type from San Diego, Calif.

Dedicated to Prof. Titus, from whom it was received.

This species is close to *H. trizonatus*, Cress., in general appearance, but is slightly more robust, the abdominal bands thinner and more griseous, the thorax less densely punctured, the abdomen with fewer punctures, etc.

*Halictus fulgidus*, n. sp.—♀. Black, shining, head very closely and coarsely punctured above the level of the antennæ, more sparsely so below; clypeus and supraclypeal space sparsely punctured, the former fringed with golden hairs; mandibles black, rufous towards tips; antennæ black, toward tip dark reddish brown; pubescence of head griseous and rather scanty; mesothorax finely tessellate, densely punctured along the edges, more sparsely so on the disc; pubescence long, thin and griseous, denser on pleura; metathorax shining black, coarsely rugose, truncation with a few coarse rugæ, but very finely striate all over; tegulæ shining black, externally testaceous; wings hyaline, nervures and stigma testaceous; legs black, apical joints of tarsi ferruginous, basal joints more or less so; pubescence of legs griseous, slightly tinged with

ochraceous, on the tarsi golden; inner hind tibial spur with four long teeth, outer pectinate; abdomen shining, very finely tessellate, first segment sparsely and finely punctured, the remaining segments densely punctured at base, becoming more sparsely so towards rear; bases of segments 2-4 with bands of appressed white pubescence; abdomen with sparse white pubescence, more conspicuous at sides and at apex, where it is slightly golden; very narrow apical margin of segments testaceous; venter dark dull reddish-brown. Length, about 9 mm.

Twenty-three specimens, Lincoln, Nebr., Apr., on willow, plum and apricot.

*Halictus Cockerelli*, n. sp. — ♀. Black, head closely and finely punctured; large and sparse on the clypeus, which is fringed with golden hairs; flagellum of antennæ ferruginous beneath, apical joints entirely so; face and cheeks densely clothed with white appressed pubescence; mandibles, except tips, ferruginous; mesothorax rather closely and very finely punctured, the surface finely roughened; median and parapsidal grooves plain; metathorax with fine rugæ proceeding from the base, but not reaching the apex; wings hyaline, splendidly iridescent; nervures, stigma and tegulæ testaceous; second submarginal cell greatly narrowed to marginal; third not much narrowed; legs brownish, knees, apices of tibiæ and tarsi entirely, testaceous; pubescence of legs griseous, of tarsi golden; inner hind tibial spur with about four or five short, blunt teeth; abdomen shining, finely punctured and finely transversely striate, brownish, the apical margins broadly depressed and testaceous; basal margins of segments 2-4 with bands of appressed white pubescence; venter dull testaceous. Length, about 5-5½ mm.

Described from five specimens collected by Prof. Cockerell at Santa Fe and Mesilia, N. M., Apr. 22nd to July, on old flower clusters of Virginia Creeper and on flowers of yellow *Sisymbrium*.

Dedicated to Prof. Cockerell for his many kindnesses and aid in various ways.

*Halictus pictus*, n. sp. — ♀. Head and thorax brassy-green; head very strongly and closely punctured on the vertex, below the antennæ the punctures large and coarse; clypeus and supra-clypeal space sparsely punctured, the former purplish black at apex, fringed with golden hairs; mandibles ferruginous, dusky at base and near apex at times; sides of face with appressed white pubescence; antennæ with scape and flagellum above black, flagellum beneath ferruginous; mesothorax with strong

punctures sparser on the disc, closer at the edges, tessellate all over; scutellum with smaller and sparser punctures; pleura with long white pubescence; metathorax with a few fine rugæ on base, not reaching apex; tegulæ testaceous; nervures and stigma honey colour; femora dark brownish; tibiæ more or less, and tarsi entirely, ferruginous; their pubescence white tinged with golden, inner spur of hind tibiæ with two or three long teeth; abdomen ferruginous, shining, apical segments dusky at times; the first two segments naked on the disc, other segments covered with whitish pubescence; venter ferruginous. Length,  $4\frac{1}{2}$ -6 mm.

Twenty-seven specimens: Sioux Co., and West Point, Holt Co., Nebr., on wild and cultivated Rose, and Mentzelia, June 10th to July 8th.

Differs from *H. Kunzei* in the mesothorax, not smooth centrally, the abdomen not black apically, and well clothed with pubescence, etc.

*Halictus Bruneri*, n. sp.—Head and thorax brassy green, pleura more olive green; head coarsely and closely punctured; clypeus with coarser and sparser punctures and black apically; mandibles ferruginous anteriorly; antennæ black; sides of face and cheeks with thin whitish pubescence; mesothorax anteriorly coarsely rugose, elsewhere very coarsely and rather closely punctured; pleura coarsely rugose; metathorax coarsely rugose, truncation with a salient rim and rugose; legs black, hind with ferruginous; all tarsi ferruginous and apices of tibiæ and knees ferruginous; wings hyaline, very slightly dusky, nervures and stigma dark testaceous; tegulæ dark brown, anteriorly punctured; abdomen black, shining, covered with appressed ochraceous pubescence, except discs of segments one and two.

Four ♀: West Point, Nebr., June 7-10, 1901, on rose and honeysuckle. Types in the author's collection.

*Halictus rugosus*, n. sp.—♀. Head and thorax greenish blue, thinly clothed with pale pubescence, slightly ochraceous on the vertex and dorsum of mesothorax, and longer on the cheeks and pleura; head behind the eyes finely roughened, in front coarsely and confluent punctured and also tessellate; less closely punctured below the antennæ; clypeus sparsely and very coarsely punctured, blackish anteriorly; supra-clypeal space finely punctured and tessellate; mandibles black, reddish medially; antennæ black, the flagellum dull brownish beneath apically; mesothorax finely roughened, the disc very coarsely and rather sparsely punctured, the sides and rear very coarsely reticulated, as is also the

scutellum; pleura of mesothorax coarsely reticulated, of metathorax coarsely striated; metathorax coarsely longitudinally striate, bordered apically by a rough irregular carina; tegulae dark, shining, with a light centre and a testaceous border; wings slightly dusky, stigma and nervures brown; legs black, the pubescence griseous, that on the inside of the tarsi golden, and more or less so on the outside; outer hind tibial spur pectinate, the inner one with three teeth, the last one small; abdomen black, polished, first segment impunctate, second finely punctured at base, that and the remaining segments finely transversely striate on the depressed apical margins; segments two and three with slight basal lateral spots of pale pubescence; all segments but first covered with sparse pubescence, more dense apically; pubescence along the anal rima slightly ochraceous; venter black, the segments tessellate, with large punctures, each bearing a hair; margins of ventral segments testaceous. Length, 6 mm.

♂.—Similar to the female in colour and sculpture, but the face more brassy, the reticulations of the mesothorax finer and the punctures sparser; head much broader than in the female and the clypeus cocked-hat shaped, with fine punctures; mandibles long, slender, ferruginous except the black base; antennae long, testaceous beneath the flagellum; cheeks produced to a spine beneath; wings and nervures darker; legs black, tarsi and base of hind tibiae testaceous; abdomen lacking the hair patches of the female. Length, 7 mm.

One female, two male specimens, Nebraska City, Nebr., Sept. 12th, 1901, on *Solidago*. (M. A. Carriker, Jr., coll.) Three females, Nebraska City, May 19th, 1901.

Although the male differs so markedly from the female in having the cheeks armed and in the different shape of the head (the inner orbits parallel), yet they are so like in other respects that they appear to be the same species.

Types in the collection of M. A. Carriker, Jr., and University of Nebraska.

*Exomalopsis Bruneri*, n. sp.—♀. Black, shining; head sparsely punctured, vertex almost impunctate, clypeus with larger, sparse punctures and narrowly testaceous anteriorly; mandibles black, reddish medially; antennae, the scape slightly reddish, flagellum ferruginous more or less dusky above; pubescence of face whitish, on the vertex brownish; sides of face with dense white decumbent pubescence, elsewhere the

pubescence of head sparse; mesothorax rather coarsely and sparsely punctured, rather densely clothed with brownish pubescence, longer and whitish on the pleura; on the disc posteriorly sparse; the scutellum bare, fringed posteriorly with brown hair; postscutellum similarly fringed posteriorly; the base of the metathorax with sparse punctures, the truncation smooth and polished; tegulae brownish; nervures and stigma honey-colour; legs black, apical joints of tarsi ferruginous; legs clothed with brownish pubescence, that on the inner side of two anterior pairs of tarsi reddish; scopa of hind legs: on tibia whitish, tinged with yellow, on tarsus dusky reddish within; abdomen with the first two segments shining, smooth, apparently punctured only at the insertion of the hairs, which are sparse; the first segment truncate basally and the edge marked by a transverse carina; apical margins of segments with bands of brownish plumose pubescence, that on the first segment reduced to two lateral spots, slightly oblique; rest of segments in front of bands with dark pubescence; pubescence at the apex of abdomen more golden; ventral segments dark, apically ferruginous. Length, 7-8 mm.

♂.—Similar to the female, but with dense hair on the face and with the clypeus and labrum yellowish-white; pubescence lighter in colour; tarsi ferruginous. Length, 7-8 mm.

In old specimens the pubescence fades out and in the male becomes a silvery-white. Many specimens taken at Lincoln, Nebr., on *Helianthus annuus*.

*Stelis pulchra*, n. sp.—♀. Head greenish, bluish on the vertex, coarsely and confluent punctured on the face, on the vertex less closely and not confluent; thorax blue with greenish and purplish reflections, strongly but not closely punctured; abdomen greenish; pubescence on face light mixed with blackish and brownish hairs; on dorsum of thorax light; on pleura dark brown; on abdomen black; scape of antennae greenish, punctured; flagellum dark testaceous, last three joints flattened on one side; tegulae bluish with a light centre, punctured; legs same colour as the thorax, tarsi with dark brown hair; wings slightly dusky; abdomen with yellowish-white colour bands on segments 1-4; that on segment one bent backwards laterally; that on segment three attenuated laterally; that on segment four not reaching the sides of the abdomen and attenuated laterally; all narrowed medially; beneath bluish. Length, about 11 mm.

One specimen, Warbonnet Canyon, Sioux Co., Nebr., June 28th, 1901.

*Epinomia triangulifera*, Vachal.—Specimens of *E. persimilis*, Ckll., were sent to Mr. Vachal, and he writes that they are identical with his species. This name, having priority, must take the place of the one given by Prof. Cockerell.

*Calliopsis verbeneæ*, var. *Nebraskensis*, n. var.—♀. Differs in having base of mandibles whitish and the apical margins of abdominal segments very pronouncedly testaceous; tegulae entirely black and very polished.

♂.—Basal joints of tarsi blackish, apical ones testaceous; abdominal segments as in ♀.

This form was found at Lincoln, Nebr., July 4-7, and none of the typical form were taken.

#### NEW NORTH AMERICAN DIPTERA.

BY CHAS. W. JOHNSON, PHILADELPHIA, PA.

*Macrocera immaculata*, n. sp.—♂ ♀. Head yellow, vertex brownish; antennae dark brown, the two basal joints yellow. Thorax dark yellow, with the anterior margin and humeri light yellow. Abdomen dark brown, shining, with a wide yellowish posterior margin on each segment. Legs yellow, slightly brownish at the tips of the femora, tibiae and tarsi; legs and abdomen in the male with fine black hairs, which are less conspicuous in the female. Wings yellowish hyaline, with a slight brownish stigma and very fine hairs. Length of body 5 mm., the antennae and posterior legs each about double the length of the body.

Two specimens collected at Richetts, North Mt., Pa., June 8, and one from the "Devil's Hole," Niagara Falls, N. Y., June 24. It resembles *M. hirsuta*, Loew, but is readily distinguished by its yellowish thorax and immaculate wings.

*Phthiria Coquilletti*, n. sp.—(*Phthiria*, n. sp. Smith's Coll. Insects of N. J., p. 649, 1899.) ♂. Face, front and occiput black, with a grayish pubescence; eyes purplish; proboscis and antennae black, base of the

third and tip of the second joint narrowly banded with yellow. Thorax velvety black, with sparse, yellowish hairs; pleura grayish, scutellum black, the margin bearing a row of yellow hairs. Abdomen black, all excepting the first segment with a wide posterior marginal band of yellow, venter entirely yellow. Femora and coxæ black, tips of the femora and the tibiæ and tarsi yellowish, the outer portions of the tibiæ and tarsi more or less brownish, but usually absent on the middle tibiæ; basal half of the knobs of the halteres blackish, the remainder white. Wings hyaline. Length of body 3 mm., proboscis 1 mm.

♀.—Head light yellow or whitish; proboscis, the ocellary tubercle and third joint of the antennæ black, base of the third joint very narrowly marked with yellow, and the first and second joints yellowish or brownish. Thorax dull yellowish gray, the scutellum and pleura somewhat lighter, with a few whitish hairs. Abdomen a light yellowish colour, with sparse white hairs, the basal half of the second, third, fourth and fifth segments a dark brown or black; in drying, the abdomen often contracts so that only the brown of the second segment is visible. Legs yellow, the base of the front femora and the outer half of all the tarsi dark brown or black. Halteres white, the basal portion of the knobs tinged with brown.

Jamesbury and Riverton, N. J., July 3-6.

I first captured a male of this species at Jamesbury, July 4, 1891. It was submitted to Mr. Coquillett, who pronounced it new, but as the antennæ were wanting in the specimen he preferred not to describe it. Last summer, on July 3 and 4, I captured three females at Riverton. As they differed so much from the male, I was still unable to straighten out the matter, so postponed further study until another season. On July 4, at Riverton, while sweeping along a wood-road leading through a pine grove, I caught a male like the Jamesbury specimen, and on the 6th succeeded in capturing at the same place two males and seven females.

To my esteemed friend, Mr. D. W. Coquillett, I now take pleasure in dedicating this interesting species.

*Psilocephala grandis*, n. sp.—♀. Head black; face and lower part of the front with a white pubescence, on the front confined to the sides

and separated by two diverging lines of black, extending from the base of the antennæ, with an angular patch of brownish pubescence above; the remainder of the front somewhat opaque, with black hairs; occiput below with white pubescence and pile, above with grayish pubescence and black hairs; antennæ black (third joint wanting). Thorax black, with two lateral and two dorsal grayish stripes, the latter dividing the black into three equal areas; pleura covered with a white pubescence; scutellum black, with a whitish border, bearing four black bristles. Abdomen black, shining, the posterior angles of the first, second, third and fifth segments with large pollinose spots, having white hairs on all, excepting those on the fifth segment, which has the short black hairs common to the greater portion of the abdomen; on the first segment the white hairs are particularly prominent and extend over the entire lateral portion; venter opaque, black, with a white posterior band on the second, third and fourth segments, first, second and third segments whitish pollinose. Legs black, slightly yellowish at the knees and base of the tarsi, the coxæ with whitish pubescence; knobs of the halteres yellow. Wings hyaline, veins and stigma dark brown, bordered by a slight brownish tinge, base of the wing yellowish, tegulæ white. Length,  $16\frac{1}{2}$  mm.

One specimen from Rouville Co., Province of Quebec, Canada; collected by Mr. G. Chagnon. The species is at once recognized by its large size. The specimen before me shows an interesting individual variation; on the right wing the fourth posterior cell is widely open, while on the left wing it is closed.

*Agromyza flaviventris*, n. sp.—Head light yellow, occiput black; antennæ yellow, aristæ black. Thorax light yellow, with a large black dorsal spot, which extends narrowly from the cervex, expanding dorsally, with lobes above the humeri and base of the wings; scutellum yellow, metathorax black. Abdomen dull light yellow, terminal segment black; halteres and legs yellow. Wings grayish hyaline. Length of the larger specimen, 2 mm.; the smaller one,  $1\frac{1}{2}$  mm.

Niagara Falls, N. Y., June 23, 1901.



## SYNOPSIS OF HALICTINÆ.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In connection with the study of the pollination of flowers by insects, for several years and in several journals I have published notes on the local Halictinæ, with descriptions of new species and the missing sexes of some which were only known in one sex. This paper is intended to bring my results together in a brief form.

The so-called genus *Halictus* of authors seems to be altogether too heterogenous. I restore *Lasioglossum* and propose two other new genera. I think that the several genera must stand or fall together. The venation shows that *Agapostemon* and *Augochlora* are more closely related to *Halictus*, as here limited, than are *Lasioglossum*, *Evyllaenus* and *Chloralictus*.

As regards the dull greenish or bluish species, the venation shows that *H. fasciatus* belongs to *Halictus*, as here limited, a conclusion which is supported by the form of the pubescent fasciæ. The rest fall into *Chloralictus*, *Paralictus* and *Dialictus*.

*Hemalictus*, Ckll., holds the same relation to *Evyllaenus* that *Dialictus* holds to *Chloralictus*. It is significant that these two genera are developed from forms in which the vein III<sub>5</sub> is normally enfeebled.

Remarkably different from Andreninæ, this nervure is very constant in Halictinæ. I have found it wanting in one specimen of *Chloralictus versatus* and in one of *Evyllaenus cylindricus* received from Pérez, of Bordeaux. I have one specimen of *Oxystoglossa confusa* with the vein *rm* wanting in one wing, and another with veins *rm* and III<sub>5</sub> both wanting in one wing.

*Oxystoglossa*, Sm., has a definite type which, I judge from the description, belongs to the group having the hind spur finely serrate. The name is therefore used to designate that group.

In this paper vein *rm* = the radio-medial cross-vein = 1st cubital nervure; vein III<sub>5</sub> = 2nd cubital nervure; vein IV<sub>3</sub> = 1st recurrent nervure; vein *a* = the cross-vein element of the arculus = the basal nervure; cell III<sub>1+2</sub> = the marginal cell; cell III<sub>3</sub> = 2nd submarginal cell; cell III<sub>4</sub> = 3rd submarginal cell; "segment" refers to the abdomen; "joint" refers to the antenna.

## Females.

Front wing with veins beyond IV<sub>3</sub> obsolescent; cells III<sub>4</sub> and III<sub>5</sub> subequal . . . . .5.

- Front wing with veins beyond  $IV_3$  not obsolescent; cell  $III_4$  at least nearly twice as long as  $III_5$  . . . . . 1.
1. Labrum flat, ciliate; cell  $III_5$  much wider than long, usually less than  $\frac{1}{2}$  as long as  $III_4$ ; cell  $III_{1+2}$  pointed on costa; vein  $IV_3$  near end of cell  $III_5$ ; metathorax usually strongly rugose; abdomen usually more or less red; hind spur finely pectinate; hind knee plate obsolete; rima on segment 5 obsolete . . . . . *Sphcodes*.  
Labrum at apex produced, laterally compressed, pectinate; rima present . . . . . 2.
2. Black or dull greenish; segments of abdomen with apical pubescent fasciae; cell  $III_{1+2}$  subappendiculate; vein  $IV_3$  beyond the middle or near end of cell  $III_5$ ; hind knee plate lanceolate; vein *a* rather suddenly bent at lower third . . . . . *Halictus*.  
Bright golden green, at least the head and thorax; segments of abdomen with pubescent fasciae basal or wanting . . . . . 3.
3. Metathorax sharply truncate, the truncation circular, bordered by salient rim; hind spur with three broad spines; hind knee plate obsolete; cell  $III_{1+2}$  subappendiculate; vein  $IV_3$  beyond middle of cell  $III_5$  . . . . . *Agapostemon*.  
Metathorax rounded posteriorly, at least above, the truncation, when evident, subquadrate . . . . . 4.
4. Hind spur with 4-6 long teeth; cell  $III_{1+2}$  subappendiculate; vein  $IV_3$  interstitial with  $III_5$ , or entering cell  $III_4$ ; vein *a* rather strongly bent about the middle; hind knee plate obsolete . . . . . *Augochlora*.  
Hind spur finely serrate; cell  $III_{1+2}$  usually pointed on costa; vein  $IV_3$  usually interstitial with  $III_5$ , rarely entering cell  $III_4$ ; vein *a* regularly arcuate; hind knee plate present, lanceolate . . . . . *Oxystoglossa*.
5. Front wing with vein  $III_5$  not obsolescent; cell  $III_{1+2}$  subappendiculate; vein  $IV_3$  near end of cell  $III_5$ ; hind spur finely serrate; insect unusually smooth and opaque; segments 2-4 with basal pubescent fasciae . . . . . *Lasioglossum*.  
Front wing with vein  $III_5$  also obsolescent or absent; vein  $IV_3$  near end of cell  $III_5$  or interstitial with vein  $III_5$  . . . . . 6.
6. Black . . . . . *Evyllaenus*.  
Dull greenish or bluish, at least the head and thorax; hind spur with 3-5 long teeth . . . . . 7.

7. Vein III<sub>5</sub> wanting ..... *Dialictus*.  
 Vein III<sub>5</sub> present ..... 8.
8. Apex of labrum produced, laterally compressed, pectinate; mandibles dentate; cheek narrow ..... *Chloralictus*.  
 Apex of labrum broadly rounded, flat, ciliate; mandibles simple; cheeks and face broad; scopa, and rima of segment 5, obsolete ..... *Paralictus*.

## Males.

- Segments with apical pubescent fasciæ; black or dull greenish ..... *Halictus*.  
 Segments without apical pubescent fasciæ ..... 1.
1. Head and thorax dull greenish or bluish ..... 6.  
 Head and thorax bright golden green ..... 4.  
 Head and thorax black ..... 2.
2. Clypeus black, rather densely whitish pubescent; cell III<sub>5</sub> usually about  $\frac{1}{2}$  as long as III<sub>4</sub>; abdomen often more or less red ..... *Sphécodes*.  
 Clypeus anteriorly with a yellowish mark, or black and thinly pubescent ..... 3.
3. Joint 4 a little shorter than 2 + 3; cheek broad; metathorax rather smooth; segments 2-4 with basal pubescent fasciæ. *Lasioglossum*.  
 Joint 4 longer than 2 + 3, or only a little longer than 3; those with basal pubescent fasciæ always have the metathorax strongly rugose ..... *Enylaeus*.
4. Abdomen black, with yellow bands ..... *Agapostemon*.  
 Abdomen like the head and thorax ..... 5.
5. Ventral segments 1-3 rigid, bright green, the others dark, retracted; tibiae green; tarsi pale ..... *Augochlora*.  
 Ventral segments dark, except sometimes the middle ones, not rigid or retracted; tibiae pale at least at base and apex ... *Oxystoglossa*.
6. Joint 4 hardly longer than 3; vein III<sub>5</sub> absent ..... *Dialictus*.  
 Joint 4 = 2 + 3, or nearly; vein III<sub>5</sub> present ..... 7.
7. Clypeus convex ..... *Chloralictus*.  
 Clypeus flat ..... *Paralictus*

## HALICTUS, Latr.

## Females.

- Dull greenish; hind spur with 4 or 5 teeth ..... *fasciatus*.  
 Black, sometimes inclining to ferruginous ..... 1.

1. Wings and legs ferruginous; hind spur finely serrate, with 12 or more teeth.....*parallelus*.  
 Wings and legs not ferruginous; hind spur with about 6-8 teeth... 2.  
 2. Cheek beneath produced into a strong tooth or dentiform angle.....*ligatus*.  
 Cheek rounded.....*Lerouxii*.

## Males.

- Dull greenish; legs yellow.....*fasciatus*.  
 Black..... 1.  
 1. Femora and wings yellow or ferruginous.....*parallelus*.  
 Femora black..... 2.  
 2. Flagellum black; mandibles usually black.....*Lerouxii*.  
 Flagellum beneath and middle of mandibles yellow.....*ligatus*.

## AGAPOSTEMON, Guérin.

## Females.

- Abdomen black.....*viridulus*.  
 Abdomen green..... 1.  
 1. Mesonotum with a distinct double punctuation.....*Texanus*.  
 Mesonotum without a distinct double punctuation..... 2.  
 2. Metathorax strongly longitudinally rugose, without enclosure.....*radiatus*.  
 Metathorax coarsely reticulated, a triangular space finely rugose.....*splendens*.

## Males.

- Abdomen with six yellow bands..... 2.  
 Abdomen with five yellow bands..... 1.  
 1. Ventral segment 4 thin, entire, 6 with a median carina.....*viridulus*.  
 Ventral segment 4 thickened, emarginate, margin depressed between the gibbous sides.....*Texanus*.  
 2. Hind femora robust, their metatarsi carinate; basal middle of abdomen ferruginous.....*splendens*.  
 Hind femora less robust, their metatarsi simple; basal middle of abdomen black, with a greenish tinge.....*radiatus*.

## AUGOCHLORA, Sm

- Segment 2 rather opaque, closely punctured, densely ciliate.....*fervida*.  
 Segment 2 shining, sparsely punctured, hardly ciliate.....*viridula*.

## OXYSTOGLOSSA, Sm.

## Females.

- Sides of mesonotum not reticulated; cell III<sub>1+2</sub> subappendediculate.....*pura*.

- Sides of mesonotum reticulated; cell III<sub>1+2</sub> pointed on costa . . . . . 1.  
 1. Larger, greener; antennæ, tegulæ and legs darker. . . . . *confusa*.  
 Smaller, more brassy; antennæ, tegulæ and legs paler. . . . . *similis*.

## Males.

- Ventral segment 4 not emarginate, greenish . . . . . *pura*.  
 Ventral segment 4 emarginate, not greenish . . . . . 1.  
 1. Larger, greener; antennæ, tegulæ and legs darker. . . . . *confusa*.  
 Smaller, more brassy; antennæ, tegulæ and legs paler. . . . . *similis*.

LASIOGLOSSUM, Curtis (Type *Melitta xanthopus*, Kby.).

## Females.

- Metathorax sharply truncate, the posterior face with sharp edge. . . . . *fuscipenne*.  
 Metathorax rounded posteriorly, no distinct posterior face. . . . . 1.  
 1. Clypeus less produced; mesonotum more shining; metathorax more rugose, more shining, the edge more salient. . . . . *Forbesii*.  
 Clypeus produced; mesonotum and metathorax smooth and opaque. . . . . *coriaceum*.

## Males.

- Face subquadrate; apex of one mandible reaching base of the other; tarsi dark. . . . . *coriaceum*.  
 Face narrowed below; apex of one mandible reaching the middle of the other; tarsi whitish. . . . . *Forbesii*.

EVYLAÆUS, gn. nov. (Type *Halictus arcuatus*, Rob.).

## Females.

- Abdomen with pubescent fasciæ interrupted or wanting. . . . . 2.  
 Abdomen with pubescent fasciæ continuous; metathorax coarsely rugose . . . . . 1.  
 1. Metathorax sharply truncate; hind spur with long distinct teeth; segment 1 impunctate. . . . . *truncatus*.  
 Metathorax a little rounded behind; hind spur with teeth shorter, more oblique, less distinct; segment 1 finely punctured. . . . . *arcuatus*.  
 2. Hind spur pectinate, with numerous fine, rather long, teeth . . . . . *pectinatus*.  
 Hind spur with 4 or 5 distinct teeth. . . . . 3.  
 3. Metathorax without an enclosed space . . . . . 5.  
 Metathorax with an enclosed space. . . . . 4.  
 4. Enclosure subtriangular; metathorax elsewhere densely pubescent . . . . . *nelumbonis*.  
 Enclosure semicircular; metathorax bare or nearly so. . . . . *pectoralis*.

5. Segments 2-4 with white pubescent patches on each side ..... *quadrinaculatus*.  
 Segments 2-4 without white pubescent patches ..... *Foxii*.

## Males.

- Antennæ long, joint 4 longer than 2 + 3 ..... 3.  
 Antennæ short, joint 4 hardly longer than 3 ..... 1.  
 1. Clypeus anteriorly, mandibles, knees and tarsi, whitish ..... *quadrinaculatus*.  
 Clypeus anteriorly and the legs dark ..... 2.  
 2. Enclosure of metathorax semicircular ..... *pectoralis*.  
 Enclosure triangular ..... *nclumbonis*.  
 3. Metathorax finely rugose, apex gibbous, shining; small ..... *Foxii*.  
 Metathorax coarsely rugose; scutel subbilobed; flagellum festooned; tarsi whitish; larger ..... 4.  
 4. Segment 1 finely, distinctly, sparsely, punctured; apical margins of segments narrowly pale testaceous ..... *arcuatus*.  
 Segment 1 almost impunctate; insect more slender, blacker, knees more whitish ..... *truncatus*.

CHLORALICTUS, gn. nov. (Type *Halictus Cressonii*, Rob.).

## Females.

- Tegulæ not punctate ..... 2.  
 Tegulæ punctate ..... 1.  
 1. Metathorax sharply truncate, with a sharp edge; wing whitish ..... *nymphæarum*.  
 Metathorax hardly truncate, the edge blunt ..... *tegularis*.  
 2. Abdomen not metallic ..... 6.  
 Abdomen greenish or bluish ..... 3.  
 3. Mesonotum shining, sparsely punctured; abdomen thinly pubescent; head hardly longer than broad; cheek broad and rounded ..... 5.  
 Mesonotum opaque, finely rugose, closely punctured; abdomen densely pubescent; head distinctly longer than broad; cheek narrow ..... 4.  
 4. Wing and pubescence yellowish; mesonotum brassy ..... *pilosus*.  
 Wing and pubescence whitish; mesonotum pale greenish ..... *pruinus*.  
 5. Dark blue ..... *cæruleus*.  
 Brassy green ..... *zephyrus*.  
 6. Mesonotum rather finely punctured ..... 8.  
 Mesonotum rather coarsely punctured ..... 7.

7. Wing and nervures whitish ..... *albipennis*.  
Wing and nervures ordinary ..... *Cressonii*.
8. Head distinctly longer than broad ; cheek narrow ; mesonotum quite opaque with fine roughness, sparsely punctured, often a little brassy ..... *cereopsis*, sp. nov.  
Head hardly longer than broad ; cheek broad ..... 9.
9. Abdomen yellowish testaceous ..... *testaceus*.  
Abdomen darker ..... 10.
10. Abdomen obovate ; segments 1-2 shining ; 3-5 darker, more opaque, with sparse closely-appressed hairs ; mesonotum shining, sparsely, finely, punctured ; metathorax nearly smooth ..... *sparsus*, sp. nov.  
Abdomen more oval, more densely pubescent, the hairs less appressed ..... 11.
11. Disc of metathorax bordered by a raised line, especially laterally ..... *Illinoensis*.  
Disc of metathorax not bordered by a raised line ..... 12.
12. Abdomen brown, segments 3-5 closely pubescent ..... *versatus*, sp. nov.  
Abdomen more black, segments 3-5 less pubescent ..... 13.
13. Raised lines of disc of metathorax not reaching the apex, the latter rounded ..... *obscurus*.  
Raised lines of metathorax reaching apex, which is truncate ..... *smilacinae*.

## Males.

- Tegulae not punctate ..... 2.  
Tegulae punctate ..... 1.
1. Metathorax with semicircular enclosure ; wing whitish ..... *nymphæarum*.  
Metathorax without enclosure ; wing ordinary ..... *tegularis*.
2. Abdomen without greenish or bluish reflection ..... 7.  
Abdomen greenish or bluish ..... 3.
3. Mesonotum smooth and shining, finely and sparsely punctured ; head hardly longer than wide ..... 6.  
Mesonotum finely rugose, opaque, closely punctured ..... 4.
4. Head a little longer than wide ; clypeus without yellowish ; the greenish tinge of abdomen slight ..... *versatus*, sp. nov.  
Head much longer than wide ; apex of clypeus usually yellowish ; abdomen distinctly greenish ..... 5.
5. Pubescence above and nervures and stigma yellowish ..... *pilosus*.

- Pubescence above and nervures and stigma whitish . . . . . *pruinusus*.
6. Dark blue . . . . . *cæruleus*.  
Greenish ; abdomen usually more or less testaceous . . . . . *zephyrus*.
7. Abdomen and tibiæ almost entirely testaceous . . . . . *zephyrus*.  
Abdomen not testaceous ; tibiæ black except often at base and  
apex . . . . . 8.
8. Sides of metathorax and pleura distinctly punctured, the latter  
beneath with a distinct fovea ; mesonotum smooth, shining,  
coarsely punctured . . . . . *foveolatus*, sp. nov.  
Sides of metathorax and pleura not distinctly punctured . . . . . 9.
9. Vein III<sub>5</sub> and beyond almost obsolete ; head much longer than  
wide ; mesonotum finely rugose, opaque, sparsely, finely punctured ;  
antennæ short ; tarsi pale . . . . . *coreopsis*, sp. nov.  
Vein III<sub>5</sub> and beyond ordinary ; head not, or hardly, longer than  
wide . . . . . 10.
10. Mesonotum finely punctured . . . . . 12.  
Mesonotum coarsely punctured, shining . . . . . 11.
11. Wing white, nervures and stigma white . . . . . *albipennis*.  
Wing ordinary, nervures and stigma dark ; metathorax coarsely  
reticulated, with a semicircular enclosure bordered by a sharp  
edge . . . . . *Cressonii*.
12. Mesonotum shining ; head wider than thorax ; metathorax at apex  
gibbous, smooth, shining ; nervures and stigma dark ; abdomen  
subclavate, almost impunctate, usually darker towards apex ;  
length 4 mm . . . . . *sparsus*, sp. nov.  
Mesonotum opaque ; abdomen hardly subclavate . . . . . 13.
13. Abdomen bronze black, minutely punctured, bare impunctate apical  
margins of segments broad ; nervures and stigma dark . . . . . *obscurus*.  
Abdomen less black, distinctly punctured, bare impunctate apical  
margins of segments narrow, often pale testaceous ; nervures and  
stigma pale : length, 4-6 mm . . . . . *versatus*, sp. nov.

PARALICTUS, Rob.

Females.

- Cheek regularly rounded ; face narrowed below . . . . . *simplex*.  
Cheek with rounded angle below middle of eye ; face narrowed  
below . . . . . *platyparius*.  
Cheek with rounded angle a little above middle of eye ; face not  
narrowed below . . . . . *cephalicus*.