The Canadian Entomologist

VOLUME XXXI.

DEBIS PORTLANDIA.

EDITED BY

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LONDON, ONTARIO.

ASSISTED BY

Dr. J. Fletcher and W. Harrington, Ottawa ; H. H. Lyman, Montreal; and Rev. Dr. T. W. Fyles, South Quebec.

London, Ont. :
The London Printing and Lithographing Company, Limited.
1899.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 1.)

In the Journal of the New York Entomological Society for March, 1899, I separated the Hymenoptera into ten superfamilies, viz.: I. Apoidea, II. Sphegoidea, III. Vespoidea, IV. Formicoidea, V. Proctotrypoidea, VI. Cynipoidea, VII. Chalcidoidea, VIII. Ichneumonoidea, IX. Siricoidea, and X. Tenthredinoidea.

In the following pages I now propose to give a classification of the second of these superfamilies, or the Sphegoidea, a large group of wasps at one time confused with the genuine fossorial wasps, but which may be readily separated from them by having the hind angles of the pronotum not extending back to the tegulæ. Of all wasps these are the ones most closely allied to the bees.

Some of the best entomologists of the past — Leach, Dahlbom, Haliday, Westwood, and others — held that the group represented many distinct families; but quite recently some of our modern systematic workers — men of the highest attainments and ability — hold quite different views, treat this vast group as a single family, and would suppress or merge into a single genus many genera that were formerly considered good and distinct.

To use a slang expression, it is the old battle between the "lumpers" and the "splitters" revived, and the evolutionary problems taking place around us are ignored or misunderstood.

I believe firmly both schools, if we may call them such, are honest in their beliefs; but since I belong to the latter, it seems to me as if the students in the former were restrained or misled by affinities, or relationships, often obscure and indefinable, and overlook the fact that evolutionary changes have already been accomplished; and, because they

find certain affinities, would treat all of these important changes that have occurred through ages of evolutionary forces as of no value or significance.

This tendency to lumping I consider a retrogression in our systematic workers, tending to confusion and to unwarrantable changes in our nomenclature ; and it is to combat this tendency and make an effort to restore to their proper standing these suppressed families and genera, in accordance with the views held by the older entomologists, that I present herewith, in tabular form, the only possible way of demonstrating thoroughly the value and utility of divisions and genera, my ideas on the classification of this great group of wasps.

Before proceeding with my tables, however, and in order to afford a basis of comparison with my own views, it may be well to call attention to the views of two leading hymenopterists who have given much time and study to this group of wasps, namely, Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences, and Dr. Franz Kohl, of the Royal Hofmuseums of Vienna, Austria.

In 1894, Mr. Fox, following the opinion of some of the recent European authorities, in his paper entitled "A Proposed Classification of the Fossorial Hymenoptera of North America," treats these wasps as representing a single family. He says : "It has been evident for some time that the existing arrangement, that contained in Cresson's Synopsis, is of little value, as it is too superficial. Entirely too many families, without characters to substantiate them, were recognized. The Sphegidæ, for instance, were divided into no less than nine families. Accepting these nine families would, it seems to me, necessitate the erection of families for such genera as Neolarra, Bothynostethus, Trypoxylon, and others, which stand more or less isolated and yet possess characters which connect them in one way or another with the formerly existing families, and would form more distinct families were they recognized than, say, the Mellinidæ, Ampulicidæ, Nyssonidæ or Bembicidæ. How these nine

supposed families have been disposed of the following pages will show."

Mr. Fox then proceeds with his classification of the Fossores *without*, however, giving a table for recognizing these families or even mentioning the salient characters that would distinguish them. He has not even given a single character for distinguishing this so-called family, Sphegidæ, but begins by saying: "I would divide this vast family into five subfamilies as follows: Spheginæ, Pemphredoninæ, Bembicinæ, Oxybelinæ, and Crabroninæ."

Fox then goes on and separates these five subfamilies into tribes: The Spheginæ he separates into two tribes, Sphegini and Ampulicini, upon most superficial and totally unreliable characters when the exotic forms are considered; the Pemphredoninæ into two tribes, Psenini and Pemphredonini; the Bembicinæ, a most conglomerate mixture, into thirteen tribes, Philanthini, Mellinini, Nyssonini, Stizini, Bembicini, Neolarrini, Bothynostethini, Astatini, Diploplectrini, Miscophini, Larrini, and Trypoxylonini; while the Crabroninæ and Oxybelinæ are without tribes.

The Oxybelinæ were first separated from the Crabronidæ in 1874 by the Swedish entomoligist, C. G. Thompson. I believe they represent a distinct family and have so treated them in my work.

In 1896, Dr. Franz Kohl, who had, however, years before published much on these wasps, published his "Die Gattungen der Sphegiden," a most valuable work, in which he treats these wasps as belonging to a single large family, the Sphegidæ, which he divides into generic groups, allied groups, subgenera and species groups.

The work is a masterpiece and should be in the hands of all students of these wasps.

Dr. Kohl recognized nine generic groups, arranged in the following sequence:

GENERIC GROUPS.	SUBGENERIC GROUPS.	ALLIED GROUPS.	SUBGENERA.	SPECIES GROUPS
I. Crabro	Crabro, s. l.	Crabro, s. str.	Crabro, Kohl.	
			Rhopalum, Kohl.	
			Brachymerus, Dahlb.	
			Lindenius	Lindenius, Dahlb.
				Entomognathus, Dahlb
				Encopognathus, Kohl.
		Anacrabro, Pack.		
	Oxybelus, Latr.	Belomicrus, Costa.	Belomicrus, Costa., s. str.	
			Oxybelomorpha, Brauns.	
		Oxybelus, Costa., s. str.		
II. Pison, Jurine	Pison, Jur., s. l.	Pison, Jur., s. l.	Parapison.	
			Pison.	
		Aulacophilus, Smith.		
		Trypoxylon, Ltr.		
	Pisonopsis, Fox.			
III. Miscophus, Jur.	Nilela, Latr.			
	Solierella, Spin.	Sylaon, Pisc.		
		Solierella spinolæ, Kohl.		
		Solierella chilensis, Kohl.		
		Nitelopsis, Saund.		
	Plenocalus, Fox.			
	Miscophus, Jur.	Miscophus	Miscophus (genuine).	
			Miscophus chrysis, Kohl.	
			Miscophus handlischii, Kohl.	
		Soliostethus, Brauns.		
		Miscophus, Brauns.		

	Lyroda, Say.	
	Tachytes, Pauz., s. l.	Gastrosericus, Spin.
		Homogambrus, Kohl.
		Parapiagetia, Kohl.
		Prosopigastra, Costa.
		Tachysphex, Kohl.
IV.		Tachytes, Pauz.
Larra, Fabr.		Ancistromma, Fox.
	Larra, F., s. l.	Larraxena, Sm.
		Larra, Fabr.
		Motes, Kohl.
		Paraliris, Kohl.
		Notogonia, Costa.
		Liris, Fabr.
		Piagetia, Rits.
	Laphyragogus, Kohl.	Laphyragogus, Kohl.
		Leianthrena, Bingham.
	Dinetus, Jur.	
	Palarus, Latr.	
	Sericophorus	Helioryctes, Sm.
		Sericophorus, Sm. (Shuck.)
		Sphodrotes, Kohl.
V.	Zoyphium, Kohl.	
Astata, Kohl.	Astata, Latr.	Astata, Spin.
		Dryudella, Spin.
	Isolated.	
	Diploplectron, Fox.	

GENERIC GROUPS.	SUBGENERIC GROUPS.	ALLIED GROUPS.	SUBGENERA.
VI. Bembex, Fab.	Isolated.		
	Heliocausus, Kohl.		
	Bembex	Bembex, Fab.	
		Microbembex, Patt.	
		Bembidula, Burm.	
		Steniolia, Say.	
		Monedula, Latr.	
	Stizus, Latr.	Stizus, Handl.	
		Handlirschia, Kohl.	
		Sphecius, Dahlb.	
	Exeirus, Shuck.		
	Kohlia, Handl. (Isol.)		
	Gorytes, Ltr. (Hdl.) (Isol.)		
	Entomosericus, Dahlb. (Isol.)		
	Mellinus, Fab. (Isol.)		
VII. Alyson, Jur.	Alyson, Jurine, s. l.		Alyson, Jur., s. str.
			Didineis, Wesm.
	Bothynostethus, Kohl, s. l.	Bothynostethus, Kohl.	
		Scapheutes, Handl.	
	Nyson, Latr. (Isolated)		Nysson.
			Hyponysson, Cress.
			Acanthostethus, Sm.
VIII. Philanthus, Fabr.	Philanthus, Kohl., s. l.	Philanthus, Kohl., s. str.	Philanthus, Kohl.
			Anthophilus, Dahlb.
		Trachypus, Klug.	
		Philoponus, Klug.	
		Aphilanthops, Patt.	
	Cerceris, Latr., s. l.	Cerceris, Latr.	Cerceris, Dhlb. (genuine).
			Nectanebus, Spin.
			Didesmus, Dahlb.
		Eucerceris, Cress.	

- IX Sphex, L.
  - Sceliphron, Ill. (Kby.), s. l.
    - Sceliphron, Ill., s. str.
      - Pelopoeus, i. sp.
      - Sceliphron.
      - Chalybion, Dahlb.
    - Podium, Fabr., s. l.
      - Podium, Fabr., s. str.
      - Dynatus, Spin.
    - Trigonopsis, Perty.
  - Ammophila, Kirby
    - Ammophila, Dahlb
      - Ammophila, Kohl.
      - Parapsammophila, Tschbg.
    - Psammophila, Dahlb.
    - Chlorion, Fabr.
  - Sphex, L., s. l.
    - Harpactopus
      - Pseudosphex, Tschbg.
      - Calosphex, Kohl.
      - Parasphex, Smith.
      - Palmodes, Kohl.
      - Gastrosphaeria, Costa.
    - Isodontia, Patt.
    - Sphex, s. str.
- X. Ampulex, Jur.
  - Aphelotoma, Westw.
  - Ampulex, Jur., s. l.
    - Ampulex, Jur., s. str.
      - Rhinopsis, Westw.
      - Ampulex, Jur. (genuine).
  - Trirogma, Westw.
  - Dolichurus, Latr.
- XI. Pemphredon
  - Psen, Kohl.
    - Psen, Latr., s. str.
      - Psen, Ltr.(genuine)=Mesopora Wesm. = Dahlbomia, Wesm.
      - Psen annulipes, Com.
      - Mimesa, Wesm.
      - Aporia, Wesm.
    - Psenulus, Kohl (= Psen, Dahlb.)
  - Pemphredon, Ltr
    - Pemphredon, Shuck.
    - Ceratophorus, Shuck.
    - Diphlebus, Westm.
  - Passaloeus, Shuck., s. l.
    - Passaloecus, Shuck., s. str.
    - Polemistus, Sauss.
  - Diodontus, Curt. (Isol.)
  - Harpactophilus, Sm. (Isol.)
  - Stigmus, Kohl.
    - Stigmus, Jur., st. Pauz.
    - Spilomena, Shuck.
    - Ammoplanus, Gir.

Every one must and will appreciate the immense work performed by Dr. Kohl in this contribution, and I feel sure the thanks of all working hymenopterologists go out to him for it. His tables are excellent, and with these and the fine figures of venation, representing nearly every known genus, no student will have any difficulty in placing in its proper genus any of these wasps he may capture, provided they are described.

I think, however, some will take exception to his peculiar views in regard to the rank and value he has given his generic groups, subgeneric groups, allied groups, subgenera and species groups. Nor do I think they will always agree with him in his arrangement of some of these groups. In some cases, at least, according to my views, he has not been successful in showing the true affinities of the groups, and has brought into juxtaposition groups and genera that are widely separated. For instance, I do not consider his group Pemphredon (representing the old family Pemphredonidæ) to have any affinity whatever with Ampulex (Ampulicidæ), next to which he has placed it.

Other similar incongruities might be pointed out, but since my views in regard to the rank, affinities and arrangement of these wasps are incorporated in the following tables, it will not be necessary to call attention to them here; they will become apparent in my table, and may be readily detected on a comparison of my arrangement with his.

My arrangement of the families recognized is as follows:

Superfamily II.—Sphegoidea.

Table of Families.

Middle tibiæ always with two apical spurs. . . . . 5.

Middle tibiæ with only one apical spur (occasionally absent in some males).

Median cell in hind wings not twice as long as the submedian, the latter often the longer; front wings with two or three submarginal cells; if with one only the head transverse, not quadrate . . 2.

Median cell in hind wings fully twice as long as the submedian; front wings with only one submarginal cell, very rarely with an indistinctly defined areolet.

Head transverse, the temples not very broad; scutellum margined, the postscutellum armed with a spine, thorn or forked process and with squamæ; front wings with the

first discoidal cell obliterated, rarely distinct, most frequently confluent with the second discoidal cell.....Family XV., Oxybelidæ.

Head large, quadrate or trapezoidal, the temples very broad; scutellum normal, the postscutellum unarmed without squamæ; front wings with the first discoidal cell always distinct, separated from the second...Family XVI., Crabronidæ.

2. Abdomen with a strong constriction between the first and second segments; eyes often emarginate within.....4.

Abdomen without a strong constriction between the first and second segments; eyes most frequently normal, rarely emarginate within.

Abdomen sessile, never petiolate.....3.

Abdomen petiolate or subpetiolate; cubitus in hind wings usually originating before the transverse median nervure, more rarely interstitial or originating slightly beyond it; transverse median nervure not sinuate ♂-shaped; ocelli distinct; labrum most frequently hidden, rarely triangularly exserted, never free.....Family XVII., Pemphredonidæ.

3. Labrum large, free, well developed and triangularly elongated, much longer than wide; cubitus in hind wings usually originating beyond the transverse median nervure, the latter sinuate or somewhat ♂-shaped; ocelli aborted, represented by cicatrices.....Family XVIII., Bembicidæ.

Labrum small, not free, usually completely hidden by the clypeus; cubitus in hind wings most frequently originating beyond the transverse median nervure, the latter straight, not ♂-shaped; mandibles often emarginate on under side; ocelli distinct or at most with the lateral or hind ocelli aborted or wanting, indicated by cicatrices; front wings with a distinct stigma.....Family XIX., Larridæ.

4. Head wider than the thorax, the temples not narrow, rather broad; eyes most frequently normal; rarely deeply emarginate within, although often slightly emarginate within; abdomen most frequently sessile or subsessile, rarely petiolate (*Tachypus*, Klug), not elongate, ovate or oblong-oval, and most frequently with a deep constriction between the segments, or at least always with a constriction between the first and second; front wings with three submarginal cells, the second often petiolate, the second and third each receiving a

recurrent nervure; cubitus in hind wings variable, interstitial or nearly, or originating far beyond the transverse median nervure.....Family XX., Philanthidæ.

Head not wider than the thorax, the temples very narrow or flat; eyes always deeply emarginate within, or reniform; abdomen elongate, clavate, the first segment elongate, petioliform; front wings with two submarginal cells, the second, however, usually more or less indistinct or subobsolete; cubitus in hind wings originating beyond the transverse median nervure.....Family XXI., Trypoxylidæ.

5. Abdomen without a constriction between the first and second segments; intermediate coxæ not contiguous.....6.

Abdomen with a more or less distinct constriction between the first and second segments, the first segment coarctate; intermediate coxæ contiguous; mesosternal suture wanting.....Family XXII., Mellinidæ.

6. Mesosternum produced into a forked process posteriorly; mesepisternum not separated; mesonotum with distinct parapsidal furrows.....8.

Mesosternum normal, not produced into a forked process posteriorly; mesepisternum separated; mesonotum without parapsidal furrows, or at most only vaguely defined.

Abdomen distinctly petiolated.....7.

Abdomen sessile or subsessile.

Labrum not free, entirely covered by the clypeus, or at most with only its apex visible; cubitus in hind wings originating *before* the transverse median nervure, rarely slightly beyond it, the latter most frequently straight, rarely sinuate or somewhat $\subset$-shaped.....Family XXIII., Nyssonidæ.

Labrum free, well developed, subtriangular or semicircular, wider than long; cubitus in hind wings originating usually before the transverse median nervure, the latter strongly sinuate or somewhat $\subset$-shaped; ocelli distinct.....Family XXIV., Stizidæ.

7. Clypeus never produced posteriorly between the antennæ, the latter inserted above the base of the clypeus; metathorax most frequently rounded posteriorly, very rarely with acute angles; cubitus in hind

wings variable, most frequently originating *beyond* the transverse median nervure, more rarely interstitial . . Family XXV., Sphegidæ.

8. Clypeus posteriorly usually carinate or produced between the insertion of the antennæ so that its basal margin is beyond a line drawn from their base ; anteriorly it is often rostriform carinate, or at least more or less produced medially ; metathorax usually long, abruptly truncate posteriorly with the angles acute or toothed, although sometimes the angles are rounded ; pronotum rather long, conically produced . . . . . Family XXVI., Ampulicidæ.

CORRESPONDENCE.

Spilosoma congrua, Walk.

Sir,—As I understand the Rev. Mr. Fyles's recent article on *Spilosoma congrua*, it is contended (1) that *S. congrua*, of Walker, is the same as *S. antigone*, Strecker, and (2) that *cunea*, Drury, is also *antigone*, not *textor*, Harris.

To the former proposition I am inclined to assent on the following grounds :

1. Grote, who made the first examination of Walker's specimens, recognized in them a distinct species.

2. Walker knew *cunea*, Dru., and well separated it from his *congrua* in these words (Cat. Brit. Mus., III., 667):

A. Alæ anticæ albæ.

B. Abdomen non maculatum.

a. Alæ sat angustæ. . . . . *cunea*, Drury.

b. Alæ latæ. . . . . *congrua*, Walker.

3. Prof. Smith's statement (Ent. Amer., V., 119), that Walker's description of *congrua* does not apply to *antigone* was doubtless due to his not having before him any specimens of Mr. Fyles's variety "f."

We may then return to the old synonymy of the species :

S. congrua, Walk.

antigone, Strk.

The larva has been described in the following places :

1870. Saunders, Can. Ent., III., 36 (as *H. cunea*).

1886. Hulst. Ent. Amer., II., 15.

1889. Soule & Elliot, Psyche, V., 263.

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Vol. XXXI. LONDON, JULY, 1899. No. 7.

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(Paper No. 2.)

Family XV.—Oxybelidæ.

Unquestionably, this group is closely related to the *Crabronidæ*, where most authorities have placed it; but, to me, the quite different shaped head, the absence of the basal abscissa of the cubitus in the front wings, and the remarkable formation of the scutellum and postscutellum, characters not found in any other group, seem to justify one in separating it from the Crabronidæ and treating it as a distinct family.

The group was first recognized as a subfamily in 1874, by C. G. Thomson, in his Skandinaviens Hymenoptera, Vol. III., p. 256.

The species prey upon small flies (Diptera), which they store up in their burrows made in loose sandy soil.

The known genera are not numerous, and may be recognized with the aid of the following table:

Table of Genera.

Mandibles beneath *not* emarginate, rarely with an indistinct median incision; submedian cell as long or very nearly as long as the median, the transverse median nervure interstitial, or nearly, with the basal nervure, or at most uniting with the median vein not much before its origin..... 2.

Mandibles distinctly emarginate beneath; submedian cell very much shorter than the median, the transverse median nervure uniting with the median vein much before the origin of the basal nervure.

Pygidium triangular with a distinct pygidial area, the hypopygidium very narrow..... .....(1) Oxybelomorpha, Brauns.

2. Marginal cell at apex pointed, or at least not distinctly truncate; mesopleura rounded, not sharply margined anteriorly; lateral ocelli as near or nearer to the front ocellus than to the eye margin; clypeus simple in both sexes.....(2) Belomicrus, Costa.

Marginal cell at apex distinctly truncate; mesopleura sharply margined anteriorly; lateral ocelli usually nearer to the eye margin than to the front ocellus.

Mandibles *with* a median tooth within; postscutellar spine acute or bluntly rounded at apex, never emarginate; clypeus in ♀ truncate, in ♂ tridentate. .....(3) Oxybelus, Latreille.

Mandibles *without* a median tooth within; postscutellar spine long, broad and always emarginate at apex; clypeus in ♀ truncate, in ♂ 4- or 5-dentate.....(4) Notoglossa, Dahlbom.

The North American species will fall in the following genera:

(1) Oxybelomorpha, Brauns.
None.

(2) Belomicrus, Costa.
(1) B. Forbesii, Robt.
(2) B. cladothricis, Ckll.
(3) B. argenteospilus, Cam.

(3) Oxybelus, Latreille.
(1) O. uniglumis, Linn.
(2) O. quadrinotatus, Say.
(3) O. similis, Cress.
(4) O. quadricolor, Ckll. et B.
(5) O. subulatus, Robt.
(6) O. cornutus, Robt.
(7) O. subcornutus, Ckll.
(8) O. punctatus, Baker.
(9) O. rejectus, Bak.
(10) O. striatus, Bak.
(11) O. Packardii, Robt.
(12) O. sericeus, Robt.
(13) O. laetus, Say.
(14) O. fulvipes, Robb.
(15) O. niger, Robb.
(16) O. Cressonii, Robt.
(17) O. heterolepis, Ckll. et B.
(18) O. dejectus, Ckll. et B.
(19) O. acutus, Bak.
(20) O. Robertsonii, Bak.
(21) O. varicoloratus, Bak.
(22) O. hirsutus, Bak.

(4) Notoglossa, Dahlbom.
(1) N. mexicanus, Robb.
(2) N. bugabensis, Cam.
(3) N. longispina, Cam.
(4) N. azteca, Cam.
(5) N. sparidens, Ckll.
(6) N. Cockerellii, Bak.
(7) N. trifidus, Ckll. et B.*
(8) N. dilutus, Bak.
(9) N. intermedius, Bak.
(10) N. emarginatus, Say.
(11) N. coloradensis, Bak.
(12) N. abdominalis, Bak.
(13) N. frontalis, Robb.

* This is founded upon a mutilated specimen, having the squama broken so as to appear trifid.

Family XVI.—Crabronidæ.

The much larger head, which is quadrate or trapezoidal, with very broad temples, the normally-shaped scutellums and the venation of the front wings—the first and second discoidal cells always being distinctly separated, never confluent—readily distinguish the family from the Oxybelidæ; while from the Pemphredonidæ, the only other family to which it shows any affinity, it is at once separated by the venation of the front wings and the *much longer median cell in the hind wings.*

In my studies on the genera of this family as well as many of the other families, I am greatly indebted to my friend, Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences, who most generously placed at my disposal such of his types and other material needed.

In this family I have recognized five distinct groups, which I call subfamilies, although they are much closer related than some of the subfamilies in other families. These may be distinguishable by the aid of the following table:

Table of Subfamilies.

Abdomen beneath *not* flat, either convex or subconvex and laterally rounded, not acute or carinate, the dorsal segments usually normal, rarely distinctly constricted at the sutures; second discoidal cell not much longer than the first, often shorter and not very narrow.....2.

Abdomen sessile, beneath *very* flat, and laterally acute or carinate, the dorsal segments with a constriction at the sutures and margined at apex; transverse median nervure in front wings uniting with the median vein *far* before the origin of the basal nervure, the second discoidal cell, in consequence, being very long and narrow, much longer than the first discoidal cell; first recurrent nervure joining the first cubital cell at or near the middle; mesopleura sharply margined anteriorly and posteriorly, and the carina of same connected with a carina along the sides of the mesosternum; mandibles at apex edentate acute; maxillary palpi 6-, labial 4-jointed..Subfamily I., Anacrabroninæ.

2. Mandibles at apex simple, edentate; maxillary palpi 6-, labial palpi 4-jointed; first recurrent nervure received by the first cubital cell at or near the middle, never very far beyond the middle.....Subfamily II., Lindeniinæ.

Mandibles at apex 2- or 3-dentate, rarely truncate and indistinctly bidentate in a few females; never, however, acute, as in the *Anacrobroninæ* and the *Lindeniinæ.*

Abdomen petiolate, or the first segment longly petioliform; the first segment always long and *without* a delicate carina laterally, or at least the lateral carinæ are not sharply defined, much abbreviated, and never extend to the apex of the segment...4.

Abdomen always sessile, never petiolate or with the first segment petioliform; the first segment never very long and always with distinct lateral carinæ that extend clear to the apex of the segment; maxillary palpi 6-jointed, labial palpi 3- or 4-jointed; antennæ in ♀ 12-, in ♂ 12- or 13-jointed..... 3.

3. Mesopleura *with* a distinct ridge, carina or crest before the middle coxæ; recurrent nervure in front wings joining the cubitus always *far* beyond the middle of the first cubital cell, at about its apical fourth or fifth; antennæ in both sexes 12-jointed, the flagellum in the ♂ not fringed with fine hairs beneath; ocelli, except very rarely, arranged in an obtuse triangle . ˙ ., the lateral ocelli being about twice as wide from each other as to the front ocellus or nearly; mesonotum and usually also the mesopleura coarsely sculptured; metathorax more or less coarsely sculptured, opaque or subopaque, never smooth, the cordate area on the posterior face wanting or at most indistinctly defined.....Subfamily III., Crabroninæ.

4. Mesopleura *without* a ridge, carina or crest before the middle coxæ, at most, and rarely, with only a pointed tubercle; recurrent nervure joining the cubitus at or near the middle of the first cubital cell or somewhat beyond the middle, or at the most never beyond its apical third; antennæ in ♀ 12-jointed, in ♂ 13-jointed, the flagellum in the latter usually fringed beneath with fine hairs; metathorax as a rule less coarsely sculptured than in the Crabroninæ, often smooth, shining, the cordate area on the posterior face distinct or indistinctly defined, never entirely wanting.....Subfamily IV., Thyreopinæ.

3. Mandibles bidentate, rarely 3-dentate or bluntly truncate in ♀; maxillary palpi most frequently 5-jointed, rarely 6-jointed, the labial palpi 3- or 4-jointed; first recurrent nervure in front wings received by the first cubital cell at or near the middle, rarely much beyond the middle.....Subfamily V., Rhopalinæ.

Subfamily I.—Anacrabroninæ.

The characters made use of in my table of families easily separate this subfamily from the others, the formation of the mesopleura and

abdomen and the long narrow second discoidal cell being quite characteristic and totally different from the other groups.

The group is quite isolated and apparently peculiar to North America.

Only a single genus is known, and with the characters already given, may be distinguished as follows:

Marginal cell in front wings a little longer than the first cubital cell, broadly truncate at apex; head transverse, the temples broad, but not quite as wide as the eyes, the hind orbits bounded by a distinct long carina posteriorly.....Anacrabro, Packard.

[Type A. ocellatus, Pack.]

North American Species.

(1) ANACRABRO, Packard.

(1) A. ocellatus, Pack.

(2) A. boerhaviæ, Ckll.

SUBFAMILY II.—Lindeniinæ.

This subfamily agrees with the *Anacrabroninæ* in its mandibular characteristics, but otherwise shows little affinity, the other characters being similar to those in the three subfamilies which follow. From these, however, it is readily separated by the mandibles being acute or rounded at apex and always edentate. In venation it agrees more nearly with Rhopalinæ, the first recurrent nervure, as in that group, being received by the first cubital cell at or near the middle, but the abdomen is sessile and not petiolate or clavate.

Only three genera are known, distinguished by the aid of the following table:

Table of Genera.

Mandibles not emarginate beneath; antennal foveæ not wider from each other than to the eyes.....2.

Mandibles emarginate beneath; antennal foveæ wider from each other than to the eyes.

Eyes hairy; mandibles with two teeth or tubercles within towards base; scutellum with the basal furrow bifoveolated; recurrent nervure uniting with the cubitus distinctly beyond the middle of the first cubital cell; transverse cubitus joining the marginal cell beyond the middle; anal lobe in hind wings extending beyond the short submedian cell; mesosternum without a ridge before the middle coxæ.....Entomognathus, Dahlb.

[Type E. brevis, Lind.]

Eyes bare; mandibles not bituberculate within; scutellum not bifoveolate at base; recurrent nervure received by the first cubital cell beyond its middle; anal lobe in hind wing not extending beyond the submedian cell; mesosternum with a strong ridge before the middle coxæ.... Encopognathus, Kohl.
[Type E. Braueri, Kohl.]

2. Recurrent nervure received by the first cubital cell at or near its middle; transverse cubitus joining the marginal cell a little before its middle; anal lobe in hind wings extending beyond the short submedian cell.. .... Lindenius, Lepeletier et Br.
[Type L. argentatus, Lep. et Br.]

North American Species.

(2) Entomognathus, Dahlb.
(1) E. texanus, Cr.

(3) Encopognathus, Kohl.
None.

(4) Lindenius, Lepel. et Br.
(1) L. errans, Fox.
(2) L. latifrons, Fox.
(3) L. armaticeps, Fox.
(4) L. flaviclypeus, Fox.
(5) L. pinguis, Fox.
(6) L. salicis, Ckll. (Ammoplanus).

Subfamily III.—Crabroninæ.

This group is probably the most extensive one in the family, the species, as a rule, being larger and more gaily coloured than those of the other groups.

The subfamily is readily separated from the others by the very distinct ridge, crest or carina on the mesopleura just before the middle coxæ, a character first pointed out, I think, by Dr. Kohl, and by the first recurrent nervure entering the first cubital cell near its apex, or at its apical fourth or fifth.

Table of Genera.

Males: mandibles at apex always bidentate ..... 10.
Females:

Mandibles at apex bidentate, rarely truncate and indistinctly bidentate; pygidium in ♀ triangular, above flat, never deeply exca-

vated and without a well-defined pygidial area, the lateral carinæ being never highly elevated; ocelli in an obtuse triangle . . . . . 8.

Mandibles at apex tridentate; pygidium narrowed towards apex, subogival, and deeply channelled or excavated, with a well-defined narrowed pygidial area, the lateral carinæ high; if triangular, which is rare, excavated.

Mandibles *without* a tooth within towards base . . . . . 7.

Mandibles *with* a distinct tooth or blunt process within towards base . . . . . 2.

2. Superorbital foveæ wanting or indicated only by a slight glabrous streak or depression near the upper border of the eyes . . . . . 4.

Superorbital foveæ sharply defined, long, linear or oblong.

Abdomen not strongly punctate, except sometimes the first segment; smooth, polished, impunctate or coriaceous, or finely, sparsely, minutely or microscopically punctate; the dorsal segments, except sometimes the first, not constricted at the sutures, nor delicately margined at apex . . . . . 3.

Abdomen distinctly and more or less strongly punctate, the dorsal segments more or less constricted at sutures and usually delicately margined at apex, or at least some of the basal segments are margined.

Thorax rather coarsely strongly punctate, the punctures more or less confluent, and sometimes with striæ or fine acciculations on the mesonotum posteriorly, the scutellum and the meso- and metapleura; metanotum reticulated or with sharply defined striæ; clypeus with a median ridge or carinæ and quadrately produced medially; the apex of same being truncate or submarginate; head large, quadrate, rather coarsely confluently punctate . . . . . Solenius, Lepel. et Br.

[Type S. interruptus, L. et Br.]

3. Head and thorax coarsely sculptured or coarsely rugoso-punctate, the mesonotum posteriorly, the scutellum and the mesopleura superiorly somewhat striate; metapleura opaque, longitudinally acciculated; abdomen with the first segment rather strongly punctate, the following smooth, at the most sparsely punctate; clypeus with a strong median ridge, which is strongly narrowly (not broadly as in *Solenius*) produced beyond the anterior margin, while on each side of it, or between the production and the eyes, is a

tooth or tubercle, so that the clypeus anteriorly appears tridentate ..... Thyreus, Lepel. et Br.

{ Type C. clypeatus, Schb., ♀. = C. vexillatus, ♂. }

4. Scrobes normal, *not* bounded by a transverse carina superiorly. ... 5.
Scrobes deep, *bounded* by a transverse carina superiorly.

Mesonotum rather coarsely confluently punctate, but without longitudinal aciculations, except sometimes slightly posteriorly and on the scutellum, the mesopleura at the most with some striæ superiorly; metathorax at sides and posteriorly striated, the metanotal area coarsely retriculated or alveolate; third antennal joint longer than the fourth, scarcely twice as long as the pedicel, joints 4–5 about equal; abdomen shining, at the most sparsely microscopically punctate ..... Ectemnius, Dahlb.

[Type C. guttatus, Lind.]

5. Mesonotum *not* longitudinally striate or aciculate, either finely or coarsely punctate; clypeus more or less strongly produced medially at apex ..... 6.

Mesonotum longitudinally striate or aciculate, as well as the scutellum, the mesopleura and the metathorax, the anterior part of the mesonotum especially laterally more or less transversely striate; clypeus not strongly produced medially, but with a median ridge or carina on its disk; third joint of antennæ long, about as long as joints 4–5 united; abdomen shining or subopaque, finely coriaceous, or microscopically punctate, the first segment highly polished ..... Crabro, Fabr.

[Tpye C. fossorius, Linne.]

6. Mesonotum on disk and posteriorly sparsely punctate, but anteriorly and at sides closely confluently punctate, subopaque; mesopleura neither strongly nor distinctly striate, except superiorly; metathorax with the basal area punctate, not striate, the posterior face rugulose, slightly striate at apex, the pleura smooth, delicately aciculated; clypeus similar to *Crabro;* third antennal joint not so elongate but longer than the fourth; abdomen finely coriaceous and microscopically punctate ..... Hypocrabro, Ashm., n. g.

[Type C. 10-maculatus, Say.]

Mesonotum closely confluently punctate, opaque or subopaque, the mesopleura and metathorax, including the basal area, strongly striate; clypeus similar to *Crabro.*

Third antennal joint about as long as joints 4–5 united, or nearly thrice as long as the pedicel or second joint; abdomen shining, but minutely or microscopically punctate, the punctures of first segment a little larger..... Pseudocrabro, Ashm., n. g.
[Type C. chrysarginus, Lepel.]

Third antennal joint much shorter than joints 4–5 united.

Abdomen, or at least the basal segment, highly polished, impunctate, or at most sparsely microscopically punctate; pygidial area much narrowed, deeply excavate and fully twice as long as wide at base; first joint of flagellum twice as long as the pedicel .... Xestocrabro, Ashm., n. g.
[Type C. 6-maculatus, Say.]

Abdomen distinctly, minutely (somewhat sparsely) punctate; pygidial area more nearly triangular, and not twice as long as wide at base; first joint of flagellum only a little longer than the pedicel..... Xylocrabro, Ashm., n. g.
[Type C. stirpicola, Pack.]

7. Ocelli in an obtuse triangle . ' ., the lateral ocelli being about twice as wide from each other as to the front ocellus, or nearly; third antennal joint not especially long; thorax sculptured as in *Solenius;* abdomen smooth, impunctate or at most feebly microscopically punctate ..... Metacrabro, Ashm., n. g.
[Type C. Kollari, Dahlb.]

Ocelli in an equilateral triangle . ' . or nearly, the lateral ocelli being not or very little farther from each other than to the front ocellus; superorbital foveæ wanting, never sharply defined, at most represented by a slight glabrous streak near the eye margin; thorax finely closely punctate, opaque, the meso- and metapleura striated; abdomen smooth, impunctate or at most microscopically coriaceously sculptured; third antennal joint elongate, as long or longer than joints 4–5 united..... Clytochrysus, Morawitz.
[Type C. sexcinctus, H. Schf.]

8. Mandibles with a tooth within near the middle or towards the base.

Superorbital foveæ very distinct, sharply defined, elongate or linear, dull at bottom..... 9.

Superorbital foveæ wanting or at most indicated only by a slight, scarcely perceptible glabrous depression or streak; third antennal joint long, about as long as joints 4–5 united or a little longer;

clypeus with a median ridge or carina; thorax rather coarsely closely punctate, the mesopleura striate and punctate; metathorax at sides, as well as its posterior face, striate or aciculate, sometimes very coarsely, the metanotal area with oblique striæ; abdomen finely but distinctly, minutely punctate.. Protothyreopus, Ashm., n. g.
[Type C. rufifemur, Pack.]

9. Clypeus medially strongly quadrately produced, with a tooth on each side between the median production and the eyes; thorax rather coarsely punctured or sculptured, shining or at most subopaque; metanotum coarsely reticulate, subopaque, the metapleura and posterior face densely striate; abdomen shining, the basal segment very distinctly punctate, the following segments less densely, more minutely or microscopically punctate; mandibles truncate, indistinctly bidentate at apex; anterior tarsi with fine short bristles beneath, the first joint slender, much longer than 2–5 united; face except scrobes and the clypeus clothed with a silvery pubescence..... ..Ceratocolus, Lepel. et Br.
[Type C. alatus, Panz.]

10. Mandibles *with* a tooth within towards base; ocelli, unless otherwise mentioned, arranged in an obtuse triangle . ' . , the lateral ocelli being very much farther from each other than to the front ocellus ... . 11.

Mandibles *without* a tooth within towards base; ocelli arranged in a triangle . ' .; superorbital foveæ wanting; clypeus produced medially; first flagellar joint elongate, beneath excised so as to appear bidentate..... Clytochrysus, Morawitz.
[Type sexcinctus, H. Schf.]

11. Superorbital foveæ wanting or at most not sharply defined, indicated only by a slight glabrous depression or streak in the sculpture close to the eye margin..... 14.

Superorbital foveæ always distinct, sharply defined, elongate or linear..... 12.

12. Front femora unarmed beneath *at base* ..... 13.

Front femora armed with a tooth, angulation or sharp ridge beneath *at base*.

Front tarsi simple, not dilated; middle tibial spur rarely distinct; flagellar joints simple, *not* emarginate beneath; thorax coarsely confluently punctate; abdomen strongly or distinctly

punctate, the dorsal segments somewhat constricted at the sutures and usually delicately margined at apex; head quadrate, coarsely punctate.....Solenius, Lep. et Br.

[Type S. interruptus, Lep.]

Front tarsi broadly dilated, the tibiæ also dilated and clothed with dense white hairs behind; middle femora compressed into a lamina beneath at base; abdomen distinctly punctate; head seen from above obtrapezoidal, from in front much longer than wide.....Ceratocolus, Lep. (pars.).

13. Front tarsi depressed or dilated, the basal joint being depressed or broad and often with a broad lamina or shield-like expansion; middle tibiæ without an apical spur.

Head normal, almost quadrate; front tarsi depressed but not very broad; middle legs normal; antennæ with the flagellar joints short, 3–12 with white obtusely rounded, blister-like elevations beneath; abdomen distinctly punctate.....Hypothyreus, Ashm., n. g.

[Type C. subterraneus, Fabr.]

Head usually much narrowed behind, seen from in front much longer than wide, seen from above obtrapezoidal, the temples very broad but converging behind; front tarsi broadly dilated, the basal joint with a broad lamina or shield-like expansion and longer than the following joints united.

Anterior femora and tibiæ clothed with a white pubescence beneath, often forming a long flocculus.

Front tarsal joints emarginate at apex; antennæ with joints 3–5 almost equal, the joints of the flagellum with blister-like elevations beneath..Thyreus, Lepel.

[Type C. clypeatus, Sch.]

Front tarsal joints not emarginate at apex; antennæ normal, joints 4–5 equal or nearly, the third longer.....Ceratocolus, Lepel.

[Type C. alatus, Panz.]

14. Antennæ with the joints of the flagellum unusually dilated or broadened.....17.

Antennæ with the joints of the flagellum slender, not broadened.

Scrobes bounded by a transverse carina superiorly; front tarsi with the basal joint depressed and broadened its entire

length; front femora dilated at extreme base beneath or with a slight tooth; middle tibiæ with a short apical spur..... Ectemnius, Dahlbom.
[Type E. guttatus, Dahlb.]

Scrobes normal, not bounded by a transverse carina superiorly.

Front femora normal, *without* a tooth beneath ..... 15.

Front femora *with* a tooth beneath *beyond* the base or near the middle; front coxæ acute or with a tooth beneath; front tarsi depressed or subdilated; head obtrapezoidal, the temples broad and strongly convergent behind; antennæ with the third joint very long, the fourth slightly emarginate at base beneath; pygidium with a median sulcus ..... Crabro, Fabr.

Front femora *with* a tooth or dilate angulation *at base* beneath; front coxæ normal; front tarsi depressed but not very broad, nearly normal; head obtrapezoidal, but the temples not so broad or so convergent as in *Crabro:* antennæ with joints 3–6 emarginate beneath, the sixth very strongly emarginate, the third usually elongate, nearly as long as 4–5 united; mesopleura and metathorax coarsely striate; middle tibial spur present but very short..... Pseudocrabro, Ashm., n. g.
[Type C. chrysarginus.]

15. Front trochanters armed with a spine or tooth beneath, the same often clothed with hairs; metathorax alveolate.

Front tarsi normal, cylindrical; middle tibiæ with an apical spur; antennæ simple, none of the joints emarginate .... Hypocrabro, Ashm., n. g.
[Type C. 10-maculatus, Say.]

Front trochanters normal, unarmed; metathorax not alveolate.

Front tarsi abnormal, dilated, or at least flattened..... 16.

Front tarsi normal, not dilated.

Middle tibiæ without an apical spur; thorax sculptured as in *Solenius;* abdomen smooth, impunctate or at most sparsely, minutely or microscopically punctate.

Antennæ normal with the second joint much thickened, none of the flagellar joints emarginate beneath..... Metacrabro, Ashm., n. g.
[Type C. Kollari, Dahlb.]

Antennæ with the second joint normal, some of the flagellar joints emarginate beneath.....Xestocrabro, Ashm., n. g.
[Type C. 6-maculatus, Say.]

Middle tibiæ with an apical spur; antennæ with the sixth joint strongly emarginate beneath; abdomen sparsely but distinctly punctate ....Xylocrabro, Ashm., n. g.
[Type C. stirpicola, Pack.]

16. Antennal joints 3 and 6 emarginate, the third about as long as 4–5 united; middle tibial spur distinct; abdomen finely, minutely, but distinctly punctate.... ..... Protothyreopus, Ashm., n. g.
[Type C. rufifemur, Pack.]

17. Abdomen distinctly punctate, the pygidium without a median sulcus.....Thyreocerus, Costa.
[Type C. crassicornis, Costa.]

North American Species.

Subfamily III.—Crabroninæ.

(5) Solenius, Lepeletier.
(1) S. cinctellus, Fox, ♀.
(2) S. interruptus, Lepel., ♀.
(3) S. bellus, Cr., ♀ ♂.
(4) S. producticollis, Pack.
(5) S. rufipes, Lep.
=excavatus, Fox.
(6) S. scaber, Lepel.
(7) S. texanus, Cr.
? S. ventralis. Cam.
(6) Thyreus, Lepel.
(7) Ectemnius, Dahlbom.
E. montanus, Cr.
E. atriceps, Cr.
E. brunneipes, Pack.
E. corrugatus, Pack.
E. parvulus, Pack.
E. pauper, Pack.
(8) Crabro, Fabricius.
(1) C. maculatus, Fabr.
singularis, Sm.
quadrangularis, Pk.
18-maculatus, Pk.
(2) C. trapezoideus, Pack.
uncertain position.
C. saxatilis, Cam.
C. Championi, Cam.
C. antiplanæ, Cam.
C. sonorensis, Cam.
C. montivagus, Cam.
C. centralis, Cam.
C. ariel, Cam.
C. vestor, Cam.
C. costariensis, Cam.
C. guerrerensis, Cam.
C. yucatensis, Cam.
C. montezuma, Cam.
(9) Hypocrabro, Ashm.
H.decemmaculatus,Say, ♀ ♂
H. Packardii, Cr., ♀.
(10) Pseudocrabro, Ashm.
(1) P. odyneroides, Cr., ♀ ♂.

(2) P. imbutus, Fox.
(3) P. chrysarginus, Lepel.
(11) Xestocrabro, Ashm.
(1) X. sexmaculatus, Say.
(2) X. trifasciatus, Say.
(3) X. paucimaculatus, Say.
(12) Xylocrabro, Ashm.
(1) X. stirpicola, Pack., ♀ ♂.
(13) Metacrabro, Ashm.
(14) Clytochrysus, Morawitz
(1) C. obscurus, Smith, ♀ ♂.
(2) C. gracilissimus, Pack.
(3) C. nigrifrons, Cr.
= *septentrionalis*, Pack.
(15) Prototothyreopus, Ashm.
(1) P. dilectus, Cr., ♀ ♂.
(2) P. bigeminus, Patt., ♀ ♂.
(3) P. rufifemur, Pack., ♀ ♂.
(4) P. villosus, Fox, ♀.
(16) Ceratocolus, Lepel. et Br.
(17) Hypothyreus, Ashm.
(18) Thyreocerus, Costa.

BOMBYX CUNEA AND SPILOSOMA CONGRUA.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

The paper in the May number of The Canadian Entomologist on the above subject is very interesting, but does not, in my opinion, entirely conclude the subject. Dr. Fyles proves definitely a considerable range of variability in what he calls *congrua*, and what is without any doubt *antigone*, Strecker. It seems to be certain that there are two species having a very similar range of variation—the insect that we call the fall webworm in the larval stage, and the insect bred by Dr. Fyles. Of the variability of *cunea* there is no doubt. I had not been aware, heretofore, that *antigone* had anything like the same range.

In the matter of determining what species Walker had before him a number of factors must be considered, as we have not available for ready examination the actual specimens described. In the first place there were three examples, apparently similar, for no variations are mentioned; but all from Georgia, and there is a very considerable range of variation in size; that is, from 16 to 20 lines, or one-third of an inch in a small species.

It becomes worth while, then, to question the distribution of the two species, *antigone* and *cunea*, and we find that whereas *cunea* is a common insect throughout the Eastern United States from the Gulf up, and extending well into Canada, we have no record of the capture of *antigone* in any Southern State. I am aware that Georgia is given as a locality in my catalogue of Arctiids, but this was without better basis than the Walker record, which was inadvertently left in. In my own collection there are no Southern specimens of *antigone*, and all the specimens in

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 3.)

SUBFAMILY IV.—Thyreopinæ.

The absence of a distinct ridge, carina or crest on the mesopleura just in front of the middle coxæ, an important structural character first made use of by Kohl, the recurrent nervure in the front wings joining the first cubital cell at or at least nearer the middle than the apex, and the great differences noticeable in the antennæ and the metathorax, readily separate this group from the Crabroninæ.

To me the Thyreopinæ seem to represent a large and distinct group, allied to the others it is true, but yet quite distinct, and divisible into many easily recognizable subgenera. It will be seen also that instead of suppressing the genera erected by some of the older entomologists, which fall in this group, and lumping them with Crabro, as has been done by Kohl and Fox, I have instead recognized all of the genera of Latreille, Dahlbom, Lepeletier, etc., and besides have founded some additional genera. All of these, I think, can be easily recognized by the student, with the use of the following table:

Table of Genera.

Ocelli arranged in an equilateral triangle or nearly ∴, the lateral ocelli about as far from each other as to the front ocellus; thorax more or less smooth or polished, shining, the metathorax feebly sculptured, almost smooth, its posterior face sometimes rugulose.....6.

Ocelli arranged in an obtuse triangle ·:·, the lateral ocelli being about twice as wide from each other as to the front ocellus; thorax with at least the metathorax rugulose, opaque, often very coarsely sculptured, the metanotum usually without, or with a poorly defined triangular or semicircular area, the posterior face often with a distinctly defined *cordate area;* the recurrent nervure joins the cubitus at or distinctly beyond the middle of the first cubital cell; abdomen always marked with yellow above; pygidium in ♀ always flat, triangular.

Males.....4.

Females:

Superorbital foveæ sharply defined, large oblique, or at least

indicated by a large oblique depression on the surface.....3.

Superorbital foveæ always wanting, never sharply defined, at most indicated only by a scarcely perceptible depression between the lateral ocelli and the eyes.

Third antennal joint longer than the fourth; metanotum with the semicircular area very coarsely, irregularly reticulate or rugose, the posterior face reticulate or transversely wrinkled, with a deep median sulcus; recurrent nervure uniting with the cubitus at or a little before the apical third of the cubital cell; abdomen alutaceous or coriaceous, impunctate, the first segment highly polished.....Anothyreus, Dahlb.

[Type A. lapponicus, Dahlb.]

Third antennal joint shorter than the fourth; metathorax coarsely irregularly reticulate, the posterior face smoother, not transversely wrinkled; mandibles at apex truncate or bluntly rounded, with a small tooth within before apex; clypeus anteriorly quadrately produced medially, with acute lateral angles.....Paranothyreus, Kohl.

[Type C. hilaris, Smith.]

3. Mandibles at apex bidentate, the inner tooth the larger, bluntly rounded; thorax closely punctate, opaque, and often with longitudinal aciculations; metathorax punctate, with a median longitudinal sulcus posteriorly, the triangular area at base rather small reticulate or alveolate.

Clypeus anteriorly broadly quadrately produced; recurrent nervure in front wings received by the cubital cell much before its apical third.....Synothyreopus, Ashm., n. g.

[Type C. tumidus, Pack.]

Clypeus anteriorly, not quadrately produced, rounded, or at most semicircularly produced; recurrent nervure in front wings received by the cubital cell at or beyond the apical third, rarely before.....Thyreopus, Latreille.

[Type C. cribrarius, Fabr.]

4. Anterior legs abnormally developed, the trochanters, the femora or tibiæ, or altogether broadened, most frequently with a shieldlike expansion on the tibiæ.....5.

Anterior legs normally developed, the tibiæ without a shieldlike expansion,

Superorbital foveæ wanting, never sharply defined, at the most represented by slight glabrous depressions; middle tibiæ with an apical spur.

Metathorax coarsely irregularly rugose, with a deep furrow on the posterior face, the latter also usually transversely wrinkled; mesonotum finely coriaceous, opaque, very sparsely punctate; anterior and middle tibiæ with a sparse flocculus beneath.....Anothyreus, Dahlbom.
[Type A. lapponicus, Dahlb.]

Metathorax coarsely reticulate; pronotum with acute lateral angles anteriorly; mesonotum closely punctate, opaque, not aciculate; mesopleura with a conical tubercle before the middle coxæ; trochanters and femora beneath clothed with a rather long, thick, white floc-
culus ..... Paranothyreus, Kohl.
[Type C. hilaris, Smith.]

5. Superorbital foveæ sharply defined, distinct, oblique, usually dull or opaque at bottom; metathorax rugose, opaque, with a deep median sulcus on posterior face; mesonotum closely punctate, opaque, often longitudinally aciculate or striate.

Antennæ with the flagellum not fusiform, hardly compressed, the joints not or scarcely wider than long, the first two always longer than wide; clypeus anteriorly quadrately produced; anterior tarsi not especially broad, without an
appendage.....Synothyreopus, Ashm., n. g.
[Type C. tumidus, Pack.]

Antennæ with the flagellum fusiform, compressed, the joints much widened, the first three or four joints fully twice as wide, or wider, than long; clypeus anteriorly, not quadrately produced, at the most semicircularly produced; anterior tarsi broad, dilated, with an appendage .....Thyreopus, Lep., et. Br.
[Type C. cribarius, Fabr.]

6. The recurrent nervure in front wings received by the cubital cell at or near the middle, or only slightly beyond the middle; abdomen usually immaculate, without yellow marks; mandibles at apex bidentate or tridentate; eyes strongly convergent below, the antennal sockets in consequence being very close to the eye margin.....7.

The recurrent nervure in front wings received by the cubital cell distinctly or considerably beyond the middle; abdomen most frequently marked with yellow, rarely immaculate; metathorax feebly sculptured, with a well-defined cordate area on the posterior face..9.

7. Males .....8.

Females:

Superorbital foveæ sharply defined, linear or wedge-shaped, and usually connected with a depression behind the lateral ocelli; abdomen polished impunctate, or at most finely, microscopically punctate; pygidium narrowed, foveated. Blepharipus, Lepel., et.Br.
[= Cœlocrabro, Thoms.*]
[Type B. nigrita, Lepel.]

Superorbital foveæ wanting, or never sharply defined, indicated only by a slight cicatrix or glabrous mark; metanotum with a well-defined semicircular area, divided by a median grooved line; abdomen smooth, impunctate, the pygidium flat, triangular, not excavated, and clothed with glittering hairs.....Crossocerus, Lep., et. Br.
[Type C. scutatus, Lepel.]

8. Superorbital foveæ sharply defined; metathorax with the cordate area *not* well defined, usually subobsolete; front legs and antennæ normal; middle tibiæ with an apical spur.

Clypeus anteriorly narrowly produced and roundly emarginate; head quadrate or subquadrate, the superorbital foveæ linear or wedge-shaped; abdomen not or scarcely longer than the head and thorax united, polished.....Blepharipus, Lepel.
= Cœlocrabro, Thoms.
[Type B. nigrita, Lepel.]

Clypeus narrowly produced medially and sinuate on each side of the production; head large, nearly quadrate, the superorbital foveæ distinct but not large, pyriform; abdomen not very long.....Epicrossocerus, Ashm., n. g.
[Type C. insolens, Fox.]

Clypeus subsemicircularly produced, not emarginate; superorbital foveæ curved, linear or lunulate; hind tibiæ strongly clavate; abdomen greatly elongate, about twice as long as the head and

* Blepharipus was subdivided by Morawitz and others before Thomson, which left *nigrita* as the type.

thorax united. (♀ unknown). Alaska..Dolichocrabro, Ashm., n.g.
[Type D. Wickhamii, Ashm.]

Superorbital foveæ not sharply defined, wanting, or at most indicated by a cicatrix or a slightly depressed glabrous line ; metathorax with a well-defined cordate area ; clypeus not emarginate anteriorly.

Front legs abnormal, the tibiæ *with* a shieldlike expansion ..... Crossocerus, Lepel.
[Type C. scutatus, Fabr.]

Front legs normal or nearly, the tibiæ *without* a shieldlike expansion, the tarsi somewhat flattened, or at most subdilated..... Stenocrabro, Ashm., n. g.
[Type C. planipes, Fox.]

9. Males ..... 10.

Females :

Superorbital foveæ wanting, or at most indicated by a glabrous depression, the occipital line or margin produced into a tooth beneath the temples ; mandibles without a tooth within, truncate or blunt at apex, indistinctly bidentate ; metathorax very feebly sculptured, with a well-defined, smooth, semicircular area at base ; abdomen smooth, sometimes with yellow maculæ ; anal lobe in hind wings as long as the submedian cell. Hoplocrabro, Thomson.
[Type C. quadrimaculatus, Fabr.]

Superorbital foveæ distinct, sharply defined, pear-shaped or broadly depressed, the occipital line normal, not ending in a tooth beneath the temples ; ocelli in an equilateral triangle ; mandibles with a tooth within near the middle, at apex tridentate ; metathorax almost smooth, shining, with a well-defined semicircular area at base ; abdomen polished ; the first segment somewhat lengthened, the pygidium triangular, punctate ; anal lobe in hind wings shorter than the submedian cell..... Cuphopterus, Morawitz.
= Blepharipus, Auc. *pars.*
[Type C. subulatus, Dahlb.]

10. Superorbital foveæ wanting, or at most indicated by a glabrous depression, never sharply defined, the occipital line or margin produced into a tooth beneath the temples ; mandibles *without* a tooth within ; at apex bidentate..... Hoplocrabro, Thomson.

Superorbital foveæ distinct, sharply defined, pear-shaped, or broadly depressed ; mandibles *with* a tooth within, at apex bidentate..... Cuphopterus, Morawitz.

North American Species.

(19) ANOTHYREUS, Dahlbom.
(1) A. hispidus, Fox, ♀.
(20) PARANOTHYREUS, Kohl.
(1) P. cingulatus, Pack., ♀ ♂.
(2) P. cognatus, Fox, ♀ ♂.
(3) P. hilaris, Smith, ♀ ♂.
(4) P. Snowii, Fox.
(21) SYNOTHYREOPUS, Ashmead.
(1) S. conspicuus, Cr., ♀.
(2) S. advenus, Smith, ♀ ♂.
(3) S. thyreophorus, Kohl, ♀ ♂.
(4) S. vernalis, Pack., ♀ ♂.
(5) S. virgatus, Fox, ♂.
(6) S. incertus, Fox, ♀ ♂.
(7) S. tumidus, Pack., ♀ ♂.
(8) S. tenuiglossus, Pack., ♀ ♂.
(22) THYREOPUS, Latreille.
(1) T. largior, Fox, ♀ ♂.
(2) T. pleuralis, Fox, ♀ ♂.
(3) T. monticola, Pack., ♀ ♂.
(4) T. pallidus, Fox, ♀ ♂.
(5) T. aequalis, Fox, ♀.
(6) T. discretus, Fox, ♀.
(7) T. argus, Pack., ♀ ♂.
(8) T. tenuis, Fox, ♀ ♂.
(9) T. medius, Fox, ♀ ♂.
(10) T. Provancheri, Fox, ♀.
(11) T. crebellifer, Pack., ♂.
(12) T. latipes, Smith, ♂.
(13) T. vicinus, Cr., ♀.
(14) T. alpestris, Cam., ♂.
(15) T. alticola, Cam., ♂.
(16) T. peltasta, Kohl, ♂.
(23) BLEPHARIPUS, Lepel. et Brullé.
(1) B. impressifrons, Smith, ♀ ♂
=tibialis, Say, nec Fab.
(2) B. Harringtonii, Fox, ♀.
(3) B. nigricornis, Prov., ♀ ♂.
(4) B. nigrior, Fox, ♀.
(5) B. cinctipes, Prov., ♀ ♂.
(6) B. ater, Cr., ♀ ♂.
(24) EPICROSSOCERUS, Ashmead.
(1) E. insolens, Fox.
(25) DOLICHOCRABRO, Ashmead.
(1) D. Wickhamii, Ashm., ♂.
(26) CROSSOCERUS, Lepel. et Brullé.
(1) C. Harrisii, Pack., ♂.
(2) C. sulcus, Fox, ♀ ♂.
(3) C. pictipes, Fox, ♂.
(4) C. incavus, Fox, ♀.
(5) C. minimus, Pack., ♀.
(6) C. propinquus, Fox.
(7) C. maculiclypeus, Fox, ♀ ♂.
(8) C. lentus, Fox, ♀.
(27) STENOCRABRO, Ashmead.
(1) S. planipes, Fox, ♂.
(2) S. tarsalis, Fox, ♂.
(3) (?) unicus, Pattn., ♀.
(28) HOPLOCRABRO, Thomson.
(29) CUPHOPTERUS, Morawitz.
(1) C. maculipennis, Smith, ♀ ♂.
(2) C. confertus, Lepel.
(3) C. nitidiventris, Fox, ♀ ♂.
(4) C. ventralis, Fox, ♀.

SUBFAMILY IV.—Rhopalinæ.

This group is readily separated from the others by the petiolate abdomen, or at least by the long and petioliform first abdominal segment, which is usually without distinct lateral carinæ.

The subfamily otherwise, however, seems to be closely allied in the structure of the thorax, and in wing characteristics, to both the *Lindeniinæ* and the *Thyreopinæ;* but besides the long, petioliform first abdominal segment, which separates the group from both, it is also separated from the former by the bidentate, not simple, mandibles, while from the latter it is also distinguished, as a rule, by antennal, mandibular, palpial and other differences.

The group may be divided into the following subgenera :

Table of Genera.

Maxillary palpi 5-jointed; labial palpi 3-jointed; mandibles bidentate at apex, very exceptionally blunt at apex in ♀.....3.

Maxillary palpi 6-jointed.

Labial palpi 3-jointed; mandibles bidentate.....2.

Labial palpi 4-jointed.

Mandibles at apex in ♀ tridentate, in ♂ bidentate; mesopleura bounded anteriorly and posteriorly by a sharp ridge or carina; head, thorax and abdomen opaque, very finely rugulose; body of abdomen oval or subovate, marked with yellow, the petiole or first segment subclavate; pygidial area in ♀ narrowed, foveate; recurrent nervure in front wings received by the cubital cell beyond the middle; antennæ in ♀ 12-, in ♂ 13-jointed.....Dasyproctus, Lep. et Br.

=Megapodium, Dahlb.

[Type D. bipunctatus, Lep.]

Mandibles in both sexes bidentate; ocelli triangularly arranged; mesopleura bounded by a sharp carina anteriorly, but not posteriorly; head and thorax finely, closely, minutely punctate; metanotal area distinct, smooth, polished, with some striæ at base, the posterior face with the cordate area well defined; abdomen clavate, impunctate, not marked with yellow, the petiole subclavate; pygidial area triangular, flat, not foveate; recurrent nervure in front wings received by the cubital cell a little before the middle; antennæ in ♀ 12-jointed, the third joint the longest, twice the length of the pedicel. (Male unknown).....Synorhopalum, Ashm., n. g.

[Type C. decorus, Fox.]

2. Face below rather broad, the eyes only slightly convergent towards

the clypeus; clypeus very short, not triangularly acute; antennal sockets somewhat distant from each other, but still wider from the eye margin than to each other; third antennal joint much shorter than the fourth, the latter being the longest joint; abdomen marked with yellow, the pygidium in ♀ narrow, somewhat lengthened.....Brachymerus, Dahlb.
=Tracheliodes, Morawitz.
=Fertonius, Perez.
[Type B. megerlei, Dahlb.]

Face narrowed below, the eyes convergent towards the clypeus; ocelli subtriangularly arranged; clypeus anteriorly medially produced, the angles of same acute; antennal sockets nearer to the eye margin than to each other, but still close together; third antennal joint not longer than the fourth, but shorter than the second or pedicel; mesopleura not bounded by a carina posteriorly; metanotal area smooth, with some short striæ at base; abdomen clavate, not marked with yellow, the pygidial area triangular, rounded at apex; antennæ in ♂ 13-jointed, normal, none of the joints emarginate or compressed; mandibles with a large tooth or process beneath near the base.....Alliognathus, Ashm., n. g.
[Type C. occidentalis, Fox.]

3. Abdominal petiole clavate, subglobosely swollen at apex.....4.
Abdominal petiole subclavate, or very gradually thickened towards apex, never subglobosely swollen at apex.
Mesosternal suture wanting or indistinct.
Head obtrapezoidal; eyes pyriform, convergent anteriorly towards the clypeus; ocelli arranged in a regular triangle; body feebly coriaceously opaque; recurrent nervure in front wings received by the cubital cell at about the middle; pygidium triangular, punctate, distinct.....Microcrabro, Saussure.
[Type M. micromegus, Sauss.]
Head similar, but larger, a little longer than wide, the temples very broad; superorbital foveæ sharply defined, linear; ocelli arranged in an equilateral triangle, and rather widely separated; a strong spine between bases of antennæ; head and thorax somewhat coarsely, rugosely punctate; recurrent nervure in front wings received by the cubital cell a little before the middle; pygidium triangular, flat; antennæ in ♀

12-, in ♂ 13-jointed; the terminal joint in the latter compressed, dilated; the others normal. . Moniæcera, Ashm., n. g.
[Type C. abdominalis, Fox.]

Mesosternal suture distinct, extending to the middle coxæ, and distinctly separating the mesosternum.

Head subquadrate or obtrapezoidal, wider than long, the temples not especially broad; mandibles at apex in ♀ truncate, blunt, in ♂ bidentate; antennæ in ♀ 12-, in ♂ 13-jointed, the latter deformed, some of the joints emarginate beneath; metathorax coarsely rugose; recurrent nervure in front wings received by the cubital cell distinctly beyond the middle; pygidium in ♀ flat, triangular. . Podagritus, Spinola.
[Type P. Gayi, Spin.]

4. Mesosternal suture wanting; mandibles in both sexes bidentate; ocelli triangularly arranged.

Metathorax smooth, the cordate area on the posterior face, more or less distinctly defined; antennæ in ♀ 12-, in ♂ 13-jointed, the latter deformed, some of the flagellar joints depressed or emarginate beneath; recurrent nervure in front wings received by the cubital cell far beyond the middle. . . . Rhopalum, Kirby.
=Corynopus, Lep., et Br.
[Type R. tibiale, Fabr.]

Metathorax feebly punctate, the cordate area less distinct; antennæ in ♀ 12-, in ♂ 13-jointed, the latter normal, none of the joints emarginate; recurrent nervure in front wings received by the cubital cell at or near the middle. . Physoscelis, Lepel., et Br.
[Type C. clavipes, Linne.]
[=rufiventris, Panz.]

North American Species.

(30) Dasyproctus, Lepeletier and Brullé.

(31) Synorhopalum, Ashmead.
(1) S. decorus, Fox, ♀.

(32) Brachymerus, Dahlbom.

(33) Alliognathus, Ashmead.
(1) A. occidentalis, Fox, ♀ ♂.

(34) Microcrabro, Saussure.

(35) Moniæcera, Ashmead.
(1) M. abdominalis, Fox, ♀.
(2) M. asperatus, Fox, ♂.

(36) Podagritus, Spinola.
? uncertain.
(1) P. fulvohirtus, Cam.
(2) P. maculitarsis, Cam.
(3) P. jason, Cam.

(37) Rhopalum, Kirby.
(1) R. pedicellatum, Pack., ♀ ♂.
(2) rufigaster, Pack., ♀ ♂.

FAMILY XVII.—Pemphredonidæ.

The difference in venation of the hind wings and the distinctly petiolate abdomen, as well as the venation of the front wings, readily distinguish this family from the *Crabronidæ*. In the former family the median cell is fully twice as long as the submedian, while in the *Pemphredonidæ* it is not twice as long as the submedian cell.

Two subfamilies have been recognized, distinguished as follows :

Table of Subfamilies.

Antennæ inserted close to the base of the clypeus ; front wings with two cubital cells, rarely with one only . . Subfamily I., Pemphredoninæ.

Antennæ inserted far above the clypeus on or near the middle of the face ; front wings with three cubital cells . . . Subfamily II., Pseninæ.

SUBFAMILY I.—Pemphredoninæ.

The insertion of the antennæ far forward, close to the base of the clypeus, is the only reliable character to separate the subfamily from the Pseninæ, although, as a rule, the head is larger, more quadrate, and the venation of the front wings is also different.

The genera may be recognized by the use of the following table :

Table of Genera.

Front wings with two recurrent nervures . . . . . 4.

Front wings with only one recurrent nervure.

Front wings with two cubital cells . . . . . 2.

Front wings with only one cubital cell.

Marginal cell short, triangular ; clypeus triangularly pointed anteriorly or with a slight median production ; mandibles bidentate, the lower tooth the longer . . . . . Ammoplanus, Girard.

2. Petiole of abdomen long . . . . . 3.

Petiole of abdomen short.

Second cubital cell quadrate ; recurrent nervure interstitial with the first transverse cubitus or nearly ; mandibles bidentate . . . . . Spilomena, Shuckard.

3. Recurrent nervure received by the first cubital cell near its middle or little beyond ; second cubital cell quadrate ; ventral plate in ♀ normal ; mandibles bidentate . . . . . Stigmus, Jurine.

Recurrent nervure received by the second cubital cell at its lower basal angle or interstitial with the first transverse cubitus ;

second cubital cell triangular; ventral plate in ♀ armed with a spine.....Harpactophilus, Smith.

4. Abdomen with the petiole never longer than the hind coxæ.....5.
Abdomen with the petiole longer than the hind coxæ; mandibles 3-dentate.
First cubital cell receiving both recurrent nervures, or the second recurrent is interstitial with the first transverse cubitus.....: Cemonus, Jurine. =Diplebus, Westw.
First and second cubital cells each receiving a recurrent nervure; second cubital cell large, usually quadrate.....Pemphredon, Shuckard.

5. Hind tibiæ along the outer face spinous or subserrate.....6.
Hind tibiæ along the outer face smooth, unarmed.
Head armed with a spine or tubercle between the antennæ; labrum not triangularly produced.....Ceratophorus, Shuckard.
Head unarmed; labrum triangularly produced..Passaloecus, Shuck.

6. Head seen from in front wider than long; clypeus at apex emarginate; abdomen ovate, not longer than the head and thorax united, the petiole very short.....Diodontus, Curtis.
Head seen from in front elongate, longer than wide; clypeus not emarginate; abdomen elongate, slender, cylindrical, longer than the head and thorax united.....Polymistus, Saussure.

North American Species.

(1) Ammoplanus, Girard.
- (1) A. columbianus, Kohl., ♀.
- (2) A. constrictus, Prov. (Anacrabro), ♀.
- (3) A. laevis, Prov. (Anacrabro), ♀.

(2) Spilomena, Shuckard.
- (1) S. pusilla, Say, ♀.
- (2) S. Foxii, Ckll.

(3) Stigmus, Jurine.
- (1) S. americanus, Pack., ♀ ♂.
- (2) S. inordinatus, Fox, ♀ ♂.
- (3) S. fraternus, Say, ♀ ♂.
- (4) S. fulvipes, Fox, ♀.
- (5) S. parallelus, Say, ♀.
- (6) S. podagritus, Kohl, ♀.
- (7) S. montivagus, Cam., ♀.

(4) Harpactophilus, Smith.

(5) Cemonus, Jurine.
- (1) C. inornatus, Say.
- (2) C. bipartior, Fox, ♀.
- (3) C. tenax, Fox, ♀ ♂.

(6) Pemphredon, Shuckard.
- (1) P. concolor, Say, ♀ ♂.
- (2) P. angularis, Fox, ♀ ♂.
- (3) P. nearticus, Kohl, ♀ ♂.

(4) P. Rileyi, Fox, ♀ ♂.
(5) P. confertim, Fox, ♂.
(6) P. Provancheri, Ashm., ♀. = concolor, Prov., nec. Say.
(7) P. montanus, Dahlb., ♀ ♂.
(8) P. (?) marginatus, Say.
(7) Ceratophorus, Shuckard.
(8) Passaloecus, Shuckard.
(1) P. annulatus, Say, ♀ ♂.
(2) P. relativus, Fox, ♂.
(3) P. distinctus, Fox, ♂.
(4) P. mandibularis, Cress, ♀ ♂.
(5) P. dispar, Fox, ♂.
(6) P. cuspidatus, Smith, ♀.
(7) P. armeniaciæ, Ckll. and Fox.
(9) Diodontus, Curtis.
(1) D. occidentalis, Fox, ♀ ♂.
(2) D. rugosus, Fox, ♂.
(3) D. flavitarsis, Fox, ♂.
(4) D. americanus, Pack., ♀ ♂.
(5) D. Gillettei, Fox, ♀.
(6) D. luguminiferus, Ckll, ♂.
(7) D. nigritus, Fox, ♀.
(10) Polymistus, Saussure.

Subfamily II.—Pseninæ.

In this subfamily, the species, as a rule, are narrower and more elongate; the head less distinctly quadrate, more transverse, with narrower temples; the front wings with three cubital cells; while *the antennæ are always inserted on or near the middle of the face, far above the clypeus.*

Psen, Latreille, was the first genus to be described, but the description was a broad one, and included all the species known at that time. It was subsequently, however, subdivided by Shuckard and others, and in order to do justice to these authors, and to prevent the erection of new generic names, I prefer to follow them in preference to Kohl, who would restrict all to a single genus, with *Sphex atra*, Fabr. (Panzer), as the type.

This was also the *status* of the subgenera up to the appearance of Kohl's work in 1896, and was acceded to and accepted by all active Hymenopterologists, and I can see no good reason for making a change in our definition of these subgenera at this late date, and thus bring confusion into our nomenclature and text-books.

The genera recognized may be tabulated as follows:

Table of Genera.

Cubitus in hind wings originating *beyond* the transverse median nervure, the latter short and straight, perpendicular.....2.

Cubitus in hind wings originating *before* the transverse median nervure, the latter long and oblique or slightly bent, but *not* perpendicular.

Second cubital cell receiving both recurrent nervures, *rarely* with the first recurrent nervure interstitial with the first transverse

cubitus, or the second recurrent interstitial with the second transverse cubitus ; inner spur of hind tibiæ dilated ; metathorax with a median sulcus, the area at base striate or alveolate ; petiole of abdomen long, usually furrowed laterally ; clypeus convex or subconvex, separated,anteriorly more or less rounded, and with a slight vein, but without a median sinus ; labrum hidden.....Mimesa, Shuckard.

=Aporia, Wesm.

[Type M. equestris, Lind.]

Second and third cubital cells each receiving a recurrent nervure, or the first recurrent nervure is interstitial with the first transverse cubitus ; head with a spine between the antennæ ; clypeus anteriorly rimmed, and with a median sinus.....Dahlbomia, Wissmann.

=Mesopora, Wesmael.

=Psen, Kohl.

[Type Sphex atra, Panz.]

2. Submedian cell in front wings a little shorter than the median, the transverse median nervure being not quite interstitial with the basal nervure ; second cubital cell usually much narrower above.

Second and third cubital cells each receiving a recurrent nervure, rarely with the first recurrent nervure interstitial with the first transverse cubitus.....Psen, Latreille.

=Psenulus, Kohl pars.

[Type P. atratus, Panz.]

Second cubital cell receiving both recurrent nervures.....Psenulus, Kohl.

[Type M. fuscipennis, Dahlb.]

North American Species.

(11) MIMESA, Shuckard.

(1) M. chalcifrons, Pack., ♀.
(2) M. argentifrons, Cross., ♀ ♂.
(3) M. Cressonii, Pack., ♀ ♂.
(4) M. borealis, Smith, ♀ ♂.
(5) M. clypeata, Fox, ♀ ♂.
(6) M. pauper, Pack., ♀ ♂.
(7) M. unicincta, Cress., ♀ ♂.
(8) M. proxima, Cress., ♀.
(9) M. basirufa, Pack., ♀ ♂.
(10) M. cylindricus, Fox., ♀ ♂.
(11) M. regularis, Fox, ♀.
(12) M. niger, Pack., ♀ ♂.
(13) M. mixta, Fox, ♀ ♂.
(14) M. leucopus, Pack., ♀ ♂.
(15) M. cingulata, Pack. ♂.
(16) M. granulosus, Fox,, ♂.
(17) M. gregaria, Fox, ♂.

(18) M. maculipes, Fox, ♂.
(19) M. longicornis, Fox, ♂.
(20) M. mellipes, Say, ♀ ♂.
(21) M. monticola, Pack., ♀ ♂.
(22) M. Mexicana, Cam , ♀.
(23) M. pulchra, Cam., ♀.
(24) M. striolata, Cam., ♀.
(25) M. longiventris, Cam., ♀.
(26) M. Cameroni, Ashm., ♀.
=monticola,Cam.,nec.,Pack.
(27) M. Montezuma, Cam., ♀.
(28) M. claviventris, Cam., ♀.

(12) DAHLBOMIA, Wissman.
(13) PSEN, Latreille.
(1) P. frontalis, Fox, ♀.
(2) P. trisulcus, Fox, ♀.
(3) P. kohlia, Fox, ♀ ♂.
(4) P. punctatus, Fox, ♀.
(5) P. simplicicornis, Fox, ♀.
(6) P. fuscipes, Pack.
(7) P. tibialis, Cr., ♀ ♂.
(8) P. suffusus, Fox, ♀.
(9) P. annulipes, Cam.
(14) PSENULUS, Kohl.

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—III.

BY GEO. B. KING, LAWRENCE, MASS.

Diaspinæ.

(46) *Aspidiotus hederæ*, Vall.; 1829–1897. I.

This is a very common pest in all greenhouses at Lawrence, and no doubt in all greenhouses in the State. It is found at Lawrence on Ivy, Palms and Cycas. A variety determined by Prof. Cockerell as probably *ericæ*, Boisd., on heather *(Erica)* in a greenhouse at Lawrence. The scale is longer than typical *hederæ*, and of a yellowish cast, and also covered more or less with the epidermis of the plant. *Hederæ* has been recorded from Kansas, Utah, Illinois, California, Florida, Colorado, New Mexico, and New York, on Ivy, China-tree, Lemon, Oleander, Orange, Lace-fern = Asparagus plumosa, Acacia, Maple, Yucca, Plum, Cherry, Currant, Melia, Grass and Clover.

(47) *Aspidiotus aurantii*, Mask.; 1878–1897. I.

Very common species on orange and lemon exposed for sale in fruit stores. Some of the fruit was completely covered with the scales and unfit for sale. They came from California and Florida. It is recorded from Arizona, California, and Illinois, on orange, lemon, grape, and rose.

(48) *Aspidiotus perniciosus*, Comst.; 1881–1895. N.

Recorded from 19 localities in this State, on apple, pear, peach, and rose. It has been reported from Alabama, Arizona, Colorado, California, North Carolina, Connecticut, Delaware, Florida, Georgia, Illinois, Idaho,

OPHIGOMPHUS.

Explanations of Plate 5.

Figs. 1 and 28—O. Carolus, Ndhm.
Figs. 10, 19 and 36—O. Mainensis, Pack.
Figs. 2, 11, 20 and 29—O. aspersus, Morse.
Figs 3, 12, 21, 30 and 31—O. rupinsulensis, Walsh.
Figs. 4, 13 and 22—O. occidentis, Hag.
Figs. 5, 14 and 23—O. Morrisoni, Sel.
Fig. 32—O. bison, Sel.
Figs 6, 15, 24 and 33—O. severus, Hag.
Figs. 7, 16, 25 and 34—O. colubrinus, Sel.
Figs. 8, 17, 26 and 35—O. Carolinus, Hag.
Figs 9, 18 and 27—O. Johannus, Ndhm.

The figures in the first column represent lateral views of the terminal abdominal appendages of the males; those in the second column, dorsal views of the same; those in the third column, the genital hamules of the males, inverted and viewed from the side; those in the fourth column, vulvar lamina of females upon the sternum of the 9th abdominal segment: — *excepting* figs. 10, front, and 19, oblique fronto-lateral views of the occipital process of the female type of O. Mainensis; fig. 26, ventral view of male abdominal appendages; and fig. 31, dorsal view of the head of O. rupinsulensis, showing the curious post-ocular tubercles: *e*, eye; *f*, frons.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 4.)

Family XVIII.—Bembicidæ.

The sessile abdomen, always without a constriction between the first and second segments, but above all the very large, free, triangularly elongated labrum, which is always much longer than wide at base, the sinuate or *c*-shaped transverse median nervure in the hind wings, and the aborted ocelli, at once distinguished the family.

Most authorities have confused, or at least included this family with the family Stizidæ, which also has a more or less prominent labrum; but in the Stizidæ the ocelli are *always* distinct, normal, the labrum is most

frequently semicircular, always wider than long, while the middle tibiæ have *two* distinct apical spurs, characters of great taxonomic value, readily recognizable, and which at once separate them from the Bembicidæ.

The genera are not numerous, and may be separated as follows:

Table of Genera.

Anterior ocellar cicatrice elliptic, round or reniform.....2.
Anterior ocellar cicatrice linear, transversely arcuate.
Metathorax excavated posteriorly, compressed laterally; last ventral segment in ♂ ending in 3 spines; mandibles dentate; maxillary palpi 6-, labial palpi 4-jointed.....Bembidula, Burm.
Metathorax flat or convex posteriorly, not compressed laterally; last ventral segment in ♂ ending in a single spine.
Mandibles dentate; maxillary palpi 4-, labial palpi 2-jointed.....Bembex, Fabr.
Mandibles edentate; maxillary palpi 3-, labial palpi 1-jointed.....Microbembex, Patton.
2. Front ocellar cicatrice round or reniform; maxilla short; maxillary palpi 6-, labial palpi 4-jointed.....Monedula, Latr.
Front ocellar cicatrice elliptic; maxilla long, attaining the hind coxæ; maxillary palpi 3-, labial palpi 1-jointed.....Steniola, Say.

North American Species.

(1) Bembidula, Burmeister.
(1) B. variegata, Olis.
(2) B. quadrifasciata, Say.
(3) B. insidiatrix, Hdl.
(4) B. parata, Prov.
(5) B. capnoptera, Hdl.
var. mesillensis, Ckll.
(6) B. fodiens, Hdl.
(7) B. diodenta, Handl.
(8) B. decisa, Taschaub.
(9) B. viduata, Handl.
(10) B. Burmeisteri, Handl.
(2) Bembex, Fabricins.
(1) B. amoena, Hdl.
(2) B. Belfragei, Cr.
=(Cressoni, Hdl.)
(3) B. insignis, Hdl.
=Belfragei, Cr., pars.
(4) B. spinolæ, Lepel.
(=fasciatus, Auct.)
(5) B. similans, Fox.
(6) B. Sayi, Cr.
(7) B. texana, Cr.
(8) B. troglodytes, Hdl.
(9) B. convexus, Fox.
(10) B. cinerea, Hdl.
(11) B. nubilipennis, Cr.
(12) B. pruinosa, Fox.
(13) B. occidentalis, Fox.
(14) B. u-scripta, Fox.
(15) B. multipicta, Smith.
(16) B. pallidipicta, Smith.

(17) B. mimas, Handl.

MIEROBEMBEX, Patton.

(1) M. monodonta, Say.

(3) MONEDULA, Latreille.

(1) M. signata, Linn, ♀ ♂.

(2) M. carolin, Fabr., ♀ ♂.

(3) M. spinosa, Cr.
=formosa, Cr.

(4) M. serrata, Hdl.

(5) M. pulchella, Hdl.
=minatula, Hdl.

(6) M. tuberculata, Fox.

(7) M. plana, Fox.

(8) M. emarginata, Cr.

(9) M. femorata, Fox.

(10) M. pictifrons, Smith.

(11) M. tenuicornis, Fox.

(12) M. scitula, Fox.

(13) M. exiqua, Fox.

(14) M. villosa, Fox.
= mamillata, Fox nec Hedl.

(15) M. usetata, Fox.

(16) M. pulla, Hdl.

(17) M. nigrifrons, Prov.

(18) M. heros, Fabr., ♀ ♂.

(19) M. surinamensis, De Geer, ♀.

(20) M. maculata, Fabr., ♀ ♂.

(21) M. punctata, Fabr., ♀ ♂.

(22) M. dives, Handl.

(23) M. mexicana, Handl.

(4) STENIOLIA, Say.

(1) S. duplicata, Say.
=scolopacea, Handl.

(2) S. obliqua, Cr.

(3) S. tibialis, Hdl.

(4) S. longirostra, Say.

FAMILY XIX.—Larridæ.

This family seems to be closely allied to the family Bembicidæ, but is readily separated from it by the *small*, not free, labrum, which is usually completely hidden under the clypeus; the ocelli are distinct or, at most, with only the hind ocelli aborted or represented by cicatrices; the front wings have always a distinct stigma, while the cubitus in the hind wings originates most frequently beyond the transverse median nervure, the latter being straight, or at least never *2*-shaped.

The family is a most extensive one, and widely distributed into all quarters of the globe, the temperate regions being especially rich in genera and species.

Four distinct groups have been recognized, which I designate as subfamilies, distinguishable as follows:

Table of Subfamilies.

Hind ocelli normal, distinct..... .....2.

Hind ocelli more or less distorted, obsolete or subobsolete, or indicated by cicatrices; mandibles most frequently emarginate on under side.....Subfamily I., Larrinæ.

2. Second cubital cell never petiolate, receiving both recurrent nervures, or the first and second submarginal cells each receive a recurrent nervure; pronotum long.....Subfamily II., Lyrodinæ.

Second cubital cell petiolate or triangular, or more rarely entirely wanting; pronotum most frequently short, transverse.

Front wings with one or two cubital cells, or with none; pygidial area wanting.....Subfamily III., Nitelinæ.

Front wings with two or three cubital cells; pygidial area present; marginal cell most frequently, but not always, truncate, with an appendage.....Subfamily IV., Pisoninæ.

SUBFAMILY I.—Larrinæ.

The aborted hind ocelli, represented at the most by cicatrices, readily separate this subfamily from the others.

The table of genera, which follows, is almost a literal translation from Dr. Franz Kohl.

Table of Genera.

Anal lobe of hind wings very large and extending to or beyond the apex of the submedian cell; third cubital cell, along the radius, shorter than along the cubitus; mandibles most frequently emarginate beneath.....2.

Anal lobe of hind wings much shorter, *not* extending to the apex of the submedian cell; third cubital cell, along the radius, as long or longer than along the cubitus; second cubital cell triangular or petiolate, receiving both recurrent nervures, or the second recurrent is interstitial; abdomen with the segments depressed at apex as in *Cerceris;* pygidial area sharply defined in both sexes.....Palarus, Latreille.

2. Eyes in ♂ *not* converging and meeting above as in *Astatus;* first and second dorsal abdominal segments with an acute margin laterally; ventral segments 6–7 free, 2–5 exhibiting in part prominent transverse swellings; marginal cell short, very broadly truncate; third transverse cubitus uniting with radius a little before the truncature; tarsal comb developed. ♂. (♀ unknown.)..Homogambrus, Kohl.

3. First abdominal segment not strikingly elongate.....4.

First abdominal segment elongate, longer than the widest part, narrower towards base, imperfectly petioliform.

Face *without* a trace of swelling or longitudinal fold along the inner eye margin, usually with a rounded central swelling on the upper part of the vertex; pronotum lying deeply beneath

the apex of the mesonotum ; clypeus with 4 median teeth anteriorly ; pygidium bare ; hind tibiæ without special characters, the tarsi of usual length, the basal joint hardly half as long as the tibiæ ; comb of front tarsi short. (♂ unknown.)..... Parapiagetia, Kohl.

Face with slight, blister-like swellings in the middle appearing as a strong transverse swelling ; no swelling on the upper frontal part; the hind ocelli lying in a flat basis ; pronotum only slightly impressed beneath the apex of the mesonotum, the collar long ; metanotum as long, or nearly, as wide ; pygidial area almost bare, with small bristles only at apex ; hind femora at basal third beneath emarginate and with a tooth, often only with a blunt process ; tarsi elongate, the basal joint of hind tarsi very distinctly longer than half the length of the tibiæ ; teeth of front tarsal comb weak, short and slender..... Piagetia, Ritsema.

4. Face *without* a swelling or fold along the inner eye margin ; pronotum more or less deeply impressed beneath the apex of the mesonotum ; metanotum usually shorter than the mesonotum ; claws simple ; mandibles emarginate beneath..... 11.

Face *with* a swelling or fold along the inner eye margin..... 5.

5. Second cubital cell not petiolate, always sessile..... 6.

Second cubital cell petiolate ; mandibles *without* a tooth within, emarginate beneath on outer side ; front tibiæ on outer side spinous ; pygidial area bare, with the sides converging posteriorly ; legs, especially the femora, stout ; hind tibiæ not ridged ; ventral plate of second segment without swelling..... Larraxena, Smith.

6. Mandibles *with* an emargination on under side..... 8.

Mandibles *without* an emargination on under side ; pronotum impressed beneath the apex of the mesonotum, especially laterally ; claws unusually long, simple..... 7.

7. Mandibles with a subbasal tooth and a strong subapical tooth within (♀) ; hind margins of the dorsal abdominal segments distinctly depressed ; pygidial area (♀) and the dorsal plate with very distinct scattered punctures, appearing (without taking into account the scattered erect hairs) bare and shining ; hind tibiæ not ridged ; front tibiæ outwardly not spinous ; body and legs with long hairs..... Paraliris, Kohl.

Mandibles within, not far from the base, with one tooth in ♂, with two teeth in ♀ ; in the latter case the second tooth is distinctly

smaller than the first; no subapical tooth within; hind margins of dorsal abdominal segments *not* distinctly depressed; pygidial area in ♀ clothed with shorter hair and stiff bristles towards apex; dorsal segments thickly tomentose, or at least with a fine pubescence; metanotum not emarginate behind; hind tibiæ longly ridged behind; front tibiæ outwardly usually spinous.....Liris, Fabr.

8. Mandibles *without* a tooth within; pygidial area in ♀ bare, *without* stiff bristles, at most with a very fine pubescence at apex only; hind tibiæ behind not ridged, or the ridge scarcely indicated. .....10.

Mandibles *with* one or two teeth within before the middle, near the base; pygidial area with stiff bristles, usually indistinct at apex; lateral margins of the pygidium convergent behind; front tarsal comb with stiff spines..... .....9.

9. Metanotum longer than the mesonotum; pygidial area clothed with a silvery pubescence; anterior femora in ♂ *not* marginate near the base..... .....Notogonia, Costa.

Metanotum shorter than the mesonotum; pygidial area bare towards the base, but with short, stiff hairs at apex; anterior femora in ♂ emarginate near the base... .....Ancistromma, Fox.

10. Claws *not* unusually long, simple; front femora either toothed or simple; lateral ridges of the pygidial area (♀) feebly curved, not distinctly convergent; ventral plate of the second abdominal segment without deplanate places; punctuation of the head and thorax distinct, proportionately not fine; abdomen in ♂ usually densely punctured, with or without a pygidial area; mesosternal suture wanting..... .....Larra, Fabr.

Claws unusually long, with a median tooth; pronotum only slightly impressed beneath the apex of the mesonotum, more towards the sides than medially; front femora without a tooth; pygidial area with the lateral margins parallel or, in only a few cases, convergent posteriorly; ventral plate of the second abdominal segment with two deplanated places at the base, which are separated by a keel-like elevation; abdomen in ♀ shining, with the margin of the segments slightly tomentose; legs rather stout; ♂ with the claws simple, the mesosternal suture distinct posteriorly....Motes, Kohl.

11. Face medially *without* a swelling, at the most with two small tubercles above the base of the antennæ; legs unusually stout; abdomen not coarsely punctured; second dorsal segments not margined at sides..... .....12.

Face medially *with* a well defined, rounded, smooth, shining swelling, placed at an equal distance between the front ocellus and the base of the antennæ; epicnemia of mesepisternum distinct; front femora in ♂ without an emargination; tarsal comb in ♀ composed of very long flexible bristles; abdomen very coarsely punctured; second dorsal segment sharply margined at sides; pygidial area in both sexes bare..... Prosopigastra, Costa.

12. Pygidial area clothed with short, stiff bristles; hind ocellar cicatrices linear, hooklike; tarsal comb in ♀ with rather short spines; front femora in ♂ either simple or emarginate near base beneath..... ...Tachytes, Panzer.

Pygidial area bare; hind ocellar cicatrices oval; tarsal comb in ♀ with long, flexible spines..... Tachysphex, Kohl.

SUBFAMILY II.—Lyrodinæ.

In this subfamily the ocelli are always distinct, normal, never aborted, the pronotum usually long, while the second cubital cell is never petiolate or triangular.

The distinct ocelli easily separate the group from the Larrinæ, while the venation of the front wings and the longer pronotum separate it from the Nitelinæ and the Pisoninæ.

The known genera may be recognized with the aid of the following table:

Table of Genera.

Marginal cell at apex truncate, or rarely rounded, but always *with* a more or less distinct appendage; two or three cubital cells..... 2.

Marginal cell lanceolate, *without* an appendage; three cubital cells.

Submedian cell shorter than the median, the second cubital cell receiving both recurrent nervures, the second recurrent entering it very close to the apex; eyes convergent above; mandibles not excised beneath..... Heliocausus, Kohl.

Submedian cell a little longer than the median, the second cubital cell receiving only one recurrent nervure at or near its middle, the first recurrent nervure received by the first cubital cell near its apex; eyes only slightly convergent above; mandibles deeply excised beneath; cubitus in hind wings originating far beyond the transverse median nervure..... Zoyphium, Kohl.

2. Front wings with two cubital cells..... 4

Front wings with three cubital cells.

Second cubital cell receiving both recurrent nervures.....3.
Second cubital cell receiving only one recurrent nervure—the second, the first recurrent nervure received by the first cubital cell near its apex.

Transverse median nervure interstitial with the basal nervure, or uniting with the median vein a little before it; cubitus in hind wings originating *beyond* the transverse median nervure; eyes somewhat convergent above; mandibles excised beneath beyond the middle.....Sericophorus, Smith.
= Tachyrhostrus, Sauss.

3. Transverse median nervure interstitial with the basal nervure; cubitus in hind wings originating somewhat *beyond* the transverse median nervure; collar long; eyes parallel; mandibles strongly excised beneath .....Lyroda, Say.
Transverse median nervure uniting with the median nervure *before* the origin of the basal nervure; cubitus in hind wings originating much *before* the transverse median nervure.

Eyes submarginate within, convergent above; clypeus transverse, the anterior margin arcuate; mandibles at apex acute, unarmed; beneath excised beyond the middle .....Laphyragogus, Kohl.

Eyes not at all emarginate within, strongly convergent above; clypeus large; mandibles excised beneath with two blunt teeth on inner margin.....Leianthrena, Bingham.

4. Submedian cell much shorter than the median; second cubital cell receiving both recurrent nervures; cubitus in hind wings originating beyond the transverse median nervure.....Gastrosericus, Spinola.

Subfamily III.—Nitelinæ.

In this group the ocelli are also distinct, but the venation of the front wings is quite distinct from the Lyrodinæ, while the pronotum is shorter, transverse. From the Pisoninæ it is also distinguished by venation, and by having *no* pygidial area.

The genera falling in this group are distinguished as follows:

Table of Genera.

Front wings *with* a marginal cell.....2.
Front wings *without* a marginal cell.

Cubital and discoidal cells wanting, the cubital vein alone present, but much abbreviated; eyes slightly convergent above; mandibles excised beneath ..... Miscophoides, Brauns.

2. Front wings with two recurrent nervures..... 4.
Front wings with only one recurrent nervure.
With two cubital cells..... 3.
With only one cubital cell; submedian cell in both wings much shorter than the median.
Marginal cell large, longer than the first cubital cell, subtruncate at apex, with a slight appendage; mandibles acute, *not* excised beneath..... Nitela, Latreille.
Marginal cell rather small, much shorter than the first cubital cell, somewhat rounded at apex, without an appendage; mandibles acute, but excised beneath..... Nitelopterus, Ashm.

3. Wings abbreviated, the stigma not developed; marginal cell small, triangular; cubital cell very large, rhomboidal; collar well developed, as long as the metathorax, narrowed anteriorly; mandibles deeply excised beneath, pointed at apex, without teeth within ..... Saliostethus, Brauns.
Wings normal, the stigma small but distinct; marginal cell as in *Miscophus;* submedian cell shorter than the median; eyes large, extending to base of mandibles, and only slightly convergent above; mandibles beneath deeply excised from a little before the basal half to apex; antennæ filiform, slightly tapering off towards apex; clypeus not separated from the face by a suture; occiput with a transverse furrow between the occipital margin and the base of the vertex; metathorax fully as long as the mesonotum, with a delicate median carina..... Miscophinus, Ashm.
[=Hypomiscophus, Ckll.]

4. Marginal cell without an appendage at apex; second cubital cell receiving the second recurrent nervure towards apex; cubitus in hind wings originating far beyond the transverse median nervure; eyes convergent above ..... Miscophus, Jurine.

Subfamily IV.—Pisoninæ.

In this group the front wings have two or three cubital cells, the second always triangular and most frequenly petiolate; the eyes are often emarginate within; the ocelli distinct; while the pygidium in the females always has a distinct pygidial area.

The group is very closely allied to the *Miscophinæ*, the only reliable character to distinguish it being the distinct pygidial area, although, as a rule, the tibial spurs and the pronotum are shorter than in the latter group.

Thirteen genera have been recognized, distinguished as follows:

Table of Genera.

Marginal cell at apex truncate or rounded, with an appendage.....3.
Marginal cell lanceolate, not truncate at apex, or at most narrowly rounded, without an appendage.
Front wings with three cubital cells.....2.
Front wings with two cubital cells, each receiving a recurrent nervure.
Transverse median nervure *interstitial* with the basal nervure.....Taranga, Kirby.
Transverse median nervure *not* interstital joining the median vein *before* the origin of the basal nervure.....Parapison, Smith.

2. Transverse median *not* interstitial joining the median vein *before* the origin of the basal nervure.
Second cubital cell larger, more briefly petiolate, receiving both recurrent nervures, or the first recurrent nervure is interstitial with the *first* transverse cubitus; mandibles excised beneath; eyes only slightly emarginate within...Pisonopsis, Fox.
Second cubital cell small, longly petiolate, receiving one or both recurrent nervures, or the second is interstitial with the second transverse cubitus: mandibles *not* excised beneath.
Second cubital cell receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus.....Pison, Spinola.
Second cubital cell receiving only one recurrent nervure —the second, the first recurrent nervure received by the first cubital cell a little *before* the first transverse cubitus.....Pisonitus, Shuckard.

Transverse median nervure interstitial, the second cubital cell triangular, receiving the second recurrent nervure near its apex, the first recurrent nervure interstitial with the first transverse cubitus; cubitus in hind wings originating *beyond* the transverse median nervure; hind femora much thickened towards apex, especially in the ♀, roughened and serrated on outer face.....Bothynostethus, Kohl.

3. Second cubital cell receiving only one recurrent nervure .....4.
Second cubital cell receiving both recurrent nervures, or the first is interstitial with the first transverse cubitus.
Submedian cell shorter than the median; cubitus in hind wings originating *beyond* the transverse median nervure; eyes within nearly parallel; mandibles excised beneath..Sphodrotes, Kohl.
Submedian and median cells equal or nearly, the transverse median nervure being interstitial or nearly, with the basal nervure; cubitus in hind wings originating *beyond* the transverse median nervure; eyes convergent above; mandibles excised or sinuate beneath.
Hind tibiæ smooth, not serrate.....Niteliopsis, Saunders.
Hind tibiæ strongly serrate and also spinose; mandibles with a deep emargination beneath; clypeus transverse, truncate and with a transverse impression along the anterior margin; hind coxæ normal, without a spine or tubercle....(Africa).
Pseudoheliorycteс, Ashm., n. g.
(Type P. Foxii, Ashm.*)
Submedian cell a little longer than the median; cubitus in hind wings originating *before* the transverse median nervure; eyes more or less divergent above; mandibles beneath with a deep incision before the middle.....Scapheutes, Handl.
4. Second cubital cell receiving the second recurrent nervure at the extreme apex, being almost interstitial with the second transverse cubitus.....5.
Second cubital cell receiving the second recurrent nervure at or near the middle.
Transverse median nervure interstitial with the basal nervure or nearly; first recurrent nervure *interstitial* with the first transverse cubitus.....Solierella, Spinola.
Transverse median nervure *not* interstitial, joining the median vein a little *beyond* the origin of the basal nervure; first recurrent nervure *not* interstitial with the first transverse cubitus.....Sylaon, Picciola.

* Pseudoheliorycteс? Foxii, n. sp.
=Heliorycteс melanopygus, Fox nec Smith, Proc. Acad. Nat. Sc., Phil., 1896, p. 554.
Female.—Length, 14 mm. Head, thorax, antennæ, and all coxæ and trochanters, black; rest of legs and the abdomen, except the pygidium above (which is dusky), ferruginous; wings fuscous black.

5. Submedian cell somewhat shorter than the median; cubitus in hind wings originating *far* beyond the transverse median nervure; anterior tarsi in ♀ with a comb; tibiæ spinous; eyes large, convergent above..... .Plenoculus, Fox.

North American Species.

Subfamily I.—*Larrinæ.*

(1) PALARUS, Latreille.
(2) HOMOGAMBRUS, Kohl.
(3) PARAPIAGETIA, Kohl.
(4) PIAGETIA, Ritsema.
(5) LARREXENA, Smith.
(6) PARALIRIS, Kohl.
(7) LIRIS, Fabr.
(8) NOTOGONIA, Costa.
  (1) N. argentata, Beauv., ♀ ♂.
  (2) N. nigripennis, Fox, ♀.
  (3) N. aequalis, Fox.
  (4) N. violaceipennis, Cam., ♀.
  (5) N. montezuma, Cam., ♀.
  (6) N. Championi, Cam., ♀.
  (7) N. truncata, Cam.
  (8) N. argentifrons, Cam.
  (9) N. beata, Cam., ♂.
  (10) N. chrysura, Cam., ♂.
  (11) N. argenticauda, Cam., ♂.
  (12) N. apicipennis, Cam., ♂.
  (13) N. panamensis, Cam., ♂.
(9) ANCISTROMMA, Fox.
  (1) A. aurantia, Fox.
  (2) A. copax, Fox.
  (3) A. distincta, Smith.
  (4) A. dolosa, Fox.
  (5) A. tenuicornis, Smith.
  (6) A. discreta, Fox.
  (7) A. conferta, Fox.
  (8) A. divisa, Patt.
  (9) A. consimilis, Fox.
  (10) A. rugosa, Fox.
  (11) A. vegeta, Fox.
  (12) ? A. canescens, Smith, ♀ (Larra).
  (13) ? A. arcuata, Smith, ♀ (Larra).
  (14) ? A. vinulenta, Cr.
(10) LARRA, Fabr.
  (1) L. analis, Fabr.
  (2) L. Cressonii, Fox.
  (3) L. Godmani, Cam., ♀.
  (4) L. rubritarsis, Cam., ♂.
  (5) L. sonorensis, Cam., ♀.
  (6) ? L. rufipes, Prov.
  (7) L. interpennis, Cr., ♀ ♂.
  (8) L. rufipennis, Fabr., ♀ ♂.
(11) MOTES, Kohl.
  (1) M. fulviventris, Guer.
  (2) M. splendens, Ashm.
(12) PROSOPIGASTRA, Costa.
(13) TACHYTES, Panzer.
  (1) T. validus, Cr.
  (2) T. mandibularis, Patt., ♀.
  (3) T. harpax, Patt., ♂.
  (4) T. calcaratus, Fox, ♂.
  (5) T. exornatus, Fox, ♀.
  (6) T. breviventris, Cr., ♀.
  (7) T. praedator, Fox.
  (8) T. columbiæ, Fox.
  (9) T. crassus, Patt.
  (10) T. pepticus, Say.
  (11) T. fulviventris, Cr.
  (12) T. spatulatus, Fox.

(13) T. aurulentus, Fabr.
(14) T. contractus, Fox.
(15) T. distinctus, Smith.
(16) T. elongatus, Cr.
(17) T. sericatus, Cr.
(18) T. rufofasciatus, Cr.
(19) T. abdominalis, Say, ♀.
(20) T. obscurus, Cr., ♀.
= texanus, Cr., ♂.
(21) T. parvus, Fox.
(22) T. abductus, Fox,
(23) T. mergus, Fox.
(24) T. dives, Lepel.
(25) T. yucatensis, Cam., ♀.
(26) T. gautemalensis, Cam., ♀.
(27) T. andreniformis, Cam.
(28) T. argentipes, Cam.
(29) T. ornatipes, Cam.
(30) T. ferrugineipes, Cam., ♂.

(14) TACHYSPHEX, Kohl.
(1) T. Ashmeadii, Fox, ♀.
(2) T. Belfragii, Cr., ♀.
(3) T. spinosus, Fox, ♀.
(4) T. posterus, Fox, ♀.
(5) T. tarsatus, Say, ♀ ♂.
(6) T. texanus, Cr., ♀ ♂.
(7) T. pissatus, Fox, ♂.
(8) T. dubius, Fox, ♂.
(9) T. semirufus, G., ♀.
(10) T. asperatus, Fox, ♀.
(11) T. antennatus, Fox, ♀.
(12) T. parvulus, Cr., ♂.
(13) T. fuscipennis, Fox, ♀.
(14) T. fusus, Fox, ♀ ♂.
(15) T. terminatus, Smith, ♀ ♂.
(16) T. apicalis, Fox, ♀ ♂.
(17) T. acutus, Patt.
(18) T. amplus, Fox, ♀ ♂.
(19) T. montanus, Cr.
(20) T. decorus, Fox, ♀.
(21) T. inusitatus, Fox, ♂.
(22) T. excatus, Fox, ♀.
(23) T. consimilis, Fox, ♀ ♂.
(24) T. quebecensis, Prov., ♀ ♂.
(25) T. compactus, Fox, ♂.
(26) T. triquitrus, Fox, ♀.
(27) T. aethiops, Cr., ♀ ♂.
(28) T. nigrior, Fox, ♀ ♂.
(29) T. pauxillus, Fox, ♀ ♂.
(30) T. punctifrons, Fox, ♀ ♂.
(31) T. mundus, Fox, ♀.
(32) T. minimus, Fox.
(33) T. psilocerus, Kohl.
(34) T. rufomaculatus, Cam., ♀.
(35) ? T. laevifrons, Smith (Larra).
(36) ? T. pennsylvanicus, Beauv. (Larra).

Subfamily II.—*Lyrodinæ*.

(15) HELIOCAUSUS, Kohl.
(16) ZOYPHIUM, Kohl.
(17) SERICOPHORUS, Smith.
(18) LYRODA, Say.
(1) L. triloba, Say.
(2) L. subita, Say.
(19) LAPHYRAGOGUS, Kohl
(20) LEIANTHRENA, Bingham.
(21) GASTROSERICUS, Spinola.

Subfamily III.—*Nitelinæ*.

(22) MISCOPHOIDES, Brauns.
(23) NITELA, Latreille.
(24) NITELOPTERUS, Ashmead.
(1) N. slossonæ, Ashm.
(25) SALIOSTETHUS, Brauns.
(26) MISCOPHINUS, Ashmead.
= Hypomiscophus, Ckll.
(1) M. laticeps, Ashm.

(2) M. californicus, Ashm.
(3) M. texanus, Ashm.
(4) M. arenarum, Ckll.
(27) Miscophus, Jurine.
(1) M. americanus, Fox, ♀ ♂.
Subfamily IV. — *Pisoninæ.*
(28) Taranga, Kirby.
(29) Parapison, Smith.
(30) Pisonopsis, Smith.
(1) P. clypeata, Fox, ♀ ♂.
(2) P. triangularis, Ashm., ♀.
(31) Pison, Spinola.
(1) P. laevis, Smith.
(2) P. conformis, Smith.
(3) P. fasciatum, Kohl.
(32) Pisonitus, Shuckard.
(33) Bothynostethus, Kohl.
(1) B. distinctus, Fox, ♀ ♂.
(2) B. Saussurei, Kohl.
(34) Sphodrotes, Kohl.
(35) Niteliopsis, Saunders.
(1) N. inermis, Cr.
(2) N. plenoculoides, Fox.
(3) N. striatipes, Ashm., ♀.
(36) Pseudoheliorycтes, Ashmead.
(37) Scapheutes, Handlirsch.
(38) Solierella, Spinola.
(39) Sylaon, Picciola.
(40) Plenoculus, Fox.
(1) P. Davisii, Fox.
(2) P. propinquus, Fox.
(3) P. punctatus, Ashm.
(4) P. Cockerellii, Ashm.
(5) P. abdominalis, Ashm.
(6) P. niger, Ashm.
(7) P. Peckhami, Ashm.
(8) P. albipes, Ashm.

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—IV.

BY GEO. B. KING, LAWRENCE, MASS.

Diaspinæ (concluded).

(71) *Chionaspis furfurus*, Fitch; 1856–1869. N.

A very common species in Massachusetts, recorded from Amherst, Worcester, Andover, Lawrence, and Methuen, on wild red cherry, pear, wild and cultivated apple, flowering quince, choke-berry, shad-bush, and black alder. It is known from Virginia, Maryland, Pennsylvania, Illinois, Indiana, West Virginia, North Carolina, Ohio, New York, Kentucky, Rhode Island, Connecticut, Georgia, Utah, Kansas, New Jersey, and Washington, D. C., on choke-cherry, wild red cherry, wild and cultivated apple, crab apple, pear, peach, Japan quince, cherry currant, red flowering currant, and European mountain ash.

(72) *Chionaspis furfurus*, var. fulva, King; 1899–1898. N.

Found at Lawrence, Mass., on buckthorn, *Rhamnus catharticus*, L.

(73) *Chionaspis spartinæ*, Comst.; 1883. N.

veins is 3 : 2 : 1, the latter shown by the younger forms, as evidenced by Saturniades, in which the more specialized *Attacinæ* have only one anal vein left on the hind wings. It is impossible to consider the Papilionides, with only one anal vein in hind wings, as representing in any way a primitive form of any of the Hesperiades. The reverse is, from this point of view, a possibility, although rendered improbable by the different type of neuration shown by the fore wings.

I conclude that a linear sequence of the diurnals, in a catalogue or otherwise, should begin with the Papilionides. The neuration of the Hesperiades offers no objection to a connection with the Agaristid-Noctuid stem of Dr. Dyar's Bombycides. The neuration of the Papilionides offers such weighty objections as to render the connection unlikely in the extreme.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 5.)

Family XX.—Philanthidæ.

The wasps belonging in this family have a peculiar habitus quite their own. The head *is always wider than the thorax*, the front wings have three cubital cells, while the abdomen, in nearly all the species, has usually a strong constriction between the first and second segments, the first segment being most frequently much narrowed. In only a single genus, *Trachypus*, Klug., is the abdomen distinctly petiolated. The eyes are large and normal, but occasionally exhibit a slight emargination within, and, more rarely, with a distinct emargination, or reniform as in *Trypoxylon* and *Pison*. Most of the species have the abdomen strongly punctured or punctate, and have also a constriction between all the abdominal sutures, although some also have the abdomen smooth and polished, and are without a constriction at the sutures.

All of the wasps in this family are predaceous, the majority of them provisioning their nests with beetles, *Curculionidæ*, *Buprestidæ*, etc., although a few prey upon the bees, *Halictus*, *Andrena*, etc.

The family is dividable into two distinct groups, which I call subfamilies, distinguishable as follows :

Table of Subfamilies.

Hind femora more or less thickened at apex, and squarely truncate and produced beneath; cubitus in hind wings originating at a considerable distance *beyond* the transverse median nervure; metanotum with a well-defined triangular area at base.....Subfamily I., Cercerinæ.

Hind femora not much thickened at apex, and neither squarely truncate nor produced beneath; cubitus in hind wings most frequently *interstitial*, or originating *before* the transverse median nervure, very rarely originating slightly beyond it; metanotum most frequently *without* a well-defined triangular area at base .....Subfamily II., Philanthinæ.

SUBFAMILY I.—Cercerinæ.

This subfamily is readily recognized by the shape of the hind femora, *which are always thickened and squarely truncate at apex, and produced into a process beneath*, and also by the venation of the hind wings, the cubitus always originating some distance beyond the transverse median nervure.

Only four genera are known, all predaceous on beetles, and distinguished as follows:

Table of Genera.

Second cubital cell petiolate .....3.

Second cubital cell *not* petiolate.....2.

2. Dorsal abdominal segments 2–4 with a median transverse furrow or impression.

Third cubital cell quadrate, the third transverse cubitus uniting with the marginal cell at apex; lateral carinæ of the pygidium terminating in a tooth. ♂.....Eucerceris, Cresson.

Third cubital cell not quadrate, the third transverse cubitus oblique, uniting with the marginal cell much before its apex; lateral carinæ of the pygidium in ♂ *not* terminating in a tooth.....Nectanebus, Spinola.

3. Third cubital cell quadrate, the third transverse cubitus joining the marginal cell at apex; dorsal abdominal segments 2–6 with a median transverse furrow or impression. ♀...Eucerceris, Cresson.

Third cubital cell not quadrate, the third transverse cubitus oblique, joining the marginal cell much before the apex; dorsal abdominal segments 2–6 without a median transverse furrow or impression, but usually margined at apex.

First abdominal segment alone much narrowed, not longer than wide, and nearly as wide as the base of second, unarmed beneath ; ventral segments 3–5 usually with a transverse grooved line.....Cerceris, Latreille.

First and second abdominal segments narrowed, the first longer than wide, the second subpyriform, the two united resembling the head and neck of a bottle, and both armed beneath with a tooth or thornlike process.....Didesmus, Dahlbom.

SUBFAMILY II.—Philanthidæ.

This group is distinguished from the preceding by the normally shaped femora, and by the venation of the hind wings, the cubitus being interstitial with the transverse median nervure, or originating a little before it, but *never originating very far beyond it.*

The species falling in this subfamily also seem to have quite different habits, for whereas those of the former prey upon beetles, those in this group, so far as have been observed, prey only upon bees, *Apis*, *Halictus*, *Andrena*, etc.

Nine genera have been recognized, distinguishable by characters made use of in the following table :

Table of Genera.

Eyes not at all emarginate within ; marginal cell at apex more or less distant from the costal margin, or subtruncate, *with* a slight appendage.....2.

Eyes with a more or less distinct emargination within ; marginal cell at apex attaining the costal margin, *without* an appendage.....4.

2. Front wings with the second discoidal cell less than twice as long as wide at apex, the median and submedian cells equal or nearly....3.

Front wings with the second discoidal cell fully twice as long as wide at apex, or even longer.

Third cubital cell, along the cubitus, about twice as long as along the radius ; pygidium in ♀ quadrangular, concave above, the clypeus margined anteriorly, but not dentate ; ♂ *with* the pygidium triangular, the clypeus anteriorly 3-dentate.....Clypeodon, Patton.

Third cubital cell, along the cubitus, usually more than twice as long as along the radius, sometimes thrice as long ; pygidium in ♀ triangular, *not* concave above, either flat or subconvex, the clypeus 3 to 5 dentate ; ♂ with the pygidium most frequently semicircular, or rarely obtusely triangular.....Aphilanthops, Patton.

3. Cubitus in hind wings interstitial with the transverse median nervure; marginal cell in front wings short, scarcely as long as the stigma, the second cubital cell triangular ..... Eremiaspheciun, Kohl.

Cubitus in hind wings originating before the transverse median nervure; marginal cell in front wings not short, the second cubital cell trapezoidal ..... Philoponus, Kohl.

4. Abdomen *longly* petiolate, the petiole nearly of a uniform thickness throughout; eyes deeply emarginate within ..... 7.

Abdomen *not* petiolate, sessile.

Eyes deeply emarginate within; cubitus in hind wings variable, most frequently interstitial, or nearly, with the transverse median nervure; abdomen smooth, polished, or at most sparsely or microscopically punctate ..... 6.

Eyes with only a slight indication of an emargination, or at least never deeply emarginate within; cubitus in hind wings most frequently originating a little before the transverse median nervure; abdomen distinctly punctate, often strongly rugoso-punctate ..... 5.

5. Submedian cell in front wings fully as long as the median; third cubital cell, along the radius, not longer than the second; abdomen finely, closely, uniformly punctured, the segments, except the first, not constricted at the sutures ..... Epiphilanthus, Ashm., n. g.
(Type P. solivagus, Say.)

Submedian cell in front wings a little shorter than the median; third cubital cell, along the radius, longer than the second; abdomen usually strongly, coarsely and irregularly punctured, the segments mostly distinctly constricted at the sutures.

Clypeus margined anteriorly, with a pencil of long hairs on each lateral angle; first recurrent nervure received by the second cubital cell before the middle; first transverse cubitus strongly angulated at basal third; ♂ with the last joint of the antennæ much compressed, broadened... Pseudanthophilus, Ashm., n. g.
(Type P. ventilabris, Fabr.)

Clypeus not margined anteriorly, and usually, but not always, without the pencil of long hairs laterally; first recurrent nervure received by the second cubital cell at or near the middle; first transverse cubitus straight or slightly sinuate, but rarely distinctly angulated; ♂ with the last joint of antennæ normal, not compressed ..... Anthophilus, Dahlb.
(Type P. politus, Say.)

6. Labrum deeply emarginate, bidentate ; mandibles simple ; antennæ short, the flagellum stout, joints 2–4 wider than long ; anterior tarsi in ♀ with a long flexible comb ; abdomen smooth, or at most finely microscopically punctate, the segments narrowly depressed at apex..... Philanthus, Fabr.

7. Head large, wider than the thorax, the eyes deeply emarginate within ; metanotum with a distinct, triangular, smooth area at base, but with a median sulcus..... Trachypus, Klug.
= Simplephilus, Dahlb.
= Philanthocephalus, Cam.

North American Species.

Subfamily I.—*Cercerinæ.*

EUCERCERIS, Cresson.
E. laticeps, Cr.
E. flavocinctus, Cr.
E. flavipes, Cr.
E. zonatus, Say.
E. rubripes, Cr.
E. unicornis, Patt.
E. elegans, Cr.
E. vittatifrons, Cr.
var. tricolor, Ckll.
E. superbus, Cr.
E. similis, Cr.
E. fulviceps, Cr.
E. montanus, Cr.
E. insignis, Prov.
E. bicolor, Cr.
E. canaliculatus, Cr.
E. cerceriformis, Cr., ♀.

NECTANEBUS, Spinola.

CERCERIS, Latreille.
C. bicornis, Guer., ♀.
C. biungulatus, Cr.
C. Blakei, Cr., ♀.
C. californica, Cr., ♂.
C. clypeata, Dahlb.
C. compacta, Cr., ♀ ♂.
C. compar, Cr., ♀ ♂.
C. dentifrons, Cr., ♀.
C. Dufourii, Guér., ♂.
C. elegans, Smith, ♂.
C. fasciola, Cr., ♂.
C. finitima, Cr., ♀.
C. firma, Cr., ♀.
C. frontata, Say.
C. fulvipes, Cr., ♀.
C. fumipennis, Say., ♀ ♂.
C. gnara, Cr., ♂.
C. imitator, Cr., ♀.
C. insolita, Cr., ♂.
C. jucunda, Cr., ♂.
C. Kennicottii, Cr., ♂.
C. mandibularis, Patt.
C. mimica, Cr., ♀ ♂.
C. morata, Cr., ♀.
C. nigrescens, Smith.
C. occipitomaculata, Pack., ♂.
C. rufinoda, Cr., ♂.
C. rufopicta, Smith, ♂.
C. sexta, Say, ♂.
C. unicincta, Taschb.
C. venator, Cr., ♂.
?=bicornis, Guér.

C. verticalis, Smith, ♀.
C. vicina, Cr., ♀.
C. Robertsonii, Fox.
C. austrina, Fox.
C. acanthophilus, Ckll.
C. aequalis, Prov.
C. simulans, Sauss., ♂.
C. Montezuma, Cam., ♀.
C. tolteca, Sauss., ♀ ♂.
C. strigosa, Cam., ♀.
C. Maximiliani, Sauss., ♀.
C. aureofascialis, Cam.
C. geniculata, Cam., ♀.
C. feralis, Cam., ♂.
C. Chiriquensis, Cam., ♀.
C. flavomaculata, Cam., ♀.
C. otomia, Sauss., ♀ ♂.
C. flavida, Cam., ♀ ♂.
C. marginata, Cam., ♀.
C. mexicana, Sauss., ♀ ♂.
C. haustecæ, Sauss., ♀.
C. semipetiolata, Sauss., ♀ ♂.
C. zapotica, Sauss., ♂.
C. obsoleta, Cam., ♀.
C. montivaga, Cam., ♀.
C. Smithiana, Cam., ♀.
C. subpetiolata, Sauss., ♀.
C. truncata, Cam., ♀ ♂.
C. imperialis, Sauss.
C. exsecta, Smith.
C. Esau, Schlett.
C. acolhua, Sauss., ♂.
C. curvicornis, Cam., ♂.
C. hebes, Cam., ♂.
C. azteca, Sauss., ♀.
C. tepaneca, Sauss., ♂.
C. erythropoda, Cam., ♀.
C. rostrata, Smith.
C. bothriophora, Schlett.
C. chrysogastra, Schlett.
C. trichiosoma, Cam., ♂.
C. pilosa, Cam., ♂.
C. scapularis, Schlett.
C. thermophila, Schlett.
C. graphica, Smith, ♀.
C. sonorensis, Cam., ♂.

DIDESMUS, Dahlbom.

D. binodis, Spin., ♀ ♂.

Subfamily II.—*Philanthinæ*

CLYPEODON, Patton.

C. quadrinotatus, Ashm., ♀.
C. concinnulus, Ckll.
C. anglesius, Ashm.

APHILANTHOPS, Patton

A. Elsiæ, Dunn.
A. frigidus, Smith.
A. subfrigidus, Dunn.
A. taurulus, Ckll.
A. Coquilletti, Ashm.
A. hispidus, Fox.
A. Utahensis, Bak.
A. laticinctus, Cr.
A. Bakeri, Dunn.
A. Foxii, Ashm.
A. nevadensis, Cr. (Philanthus).
A. marginipennis, Cam., ♂.
A. punctifrons, Cam., ♀.

EREMIASPHECIUM, Kohl.

PHILOPONUS, Kohl,

EPIPHILANTHUS, Ashmead.

(1) E. solivagus, Say.
(2) E. Sandbornii, Cr.

PSEUDANTHOPHILUS, Ashmead.

(1) P. ventralis, Fabr.

? P. frontalis, Cr.
? P. xanthostigma, Cam., ♀.
? P. maculifrons, Cam., ♂.
? P. multimaculata, Cam., ♂.

ANTHOPHILUS, Dahlbom.

A. politus, Say.
A. albifrons, Cr.
A. flavifrons, Cr.
A. pacificus, Cr.
A. albopilosus, Cr.
A. scelestus, Cr.
A. dubius, Cr.
A. sublimis, Cr.

PHILANTHUS, Fabricius.

P. bilunatus, Cr.

TRACHYPUS, Klug.

T. mexicanus, Sauss.
T. punctifrons, Cam., ♂.
T. hirticeps, Cam., ♂.
T. gracilis, Cam., ♂.

FAMILY XXI.—Trypoxylidæ.

This family has usually been classified with the family *Crabronidæ*, with which it has no affinity whatever, its affinities being closest to the Larridæ, through *Pison*, and to the Philanthidæ through *Trachypus;* but is readily separated from both by the characters made use of in my table of families.

Trypoxylon, the type of the family, was probably classified, by the older entomologists, with the Crabronidæ on account of its elongate, narrow form, and its petiolate, clavate abdomen, which gives it a superficial resemblance to the Crabronid genus *Rhopalum*. Structurally, however, it has no relations whatever with this or allied genera, differing widely in the structure of the head and in the venation of both pairs of wings.

Only two genera are known, separable as follows :

Table of Genera.

Front wings with two cubital cells, the second usually indistinctly defined ; eyes deeply emarginate within.

Median and submedian cells in front wings of an equal length, the transverse median nervure being interstitial with the basal nervure ; first recurrent nervure interstitial with the first transverse cubitus or nearly, the second recurrent received by the second cubital cell before the middle..... Aulacophilus, Smith.

Median cell in front wings distinctly longer than the submedian, the transverse median nervure joining the median vein *before* the origin of the basal nervure ; first recurrent nervure uniting with the cubitus before the first transverse cubitus ; second recurrent nervure rarely distinctly defined, usually indicated by a fuscous line or streak..... Trypoxylon, Latreille.

North American Species.

AULACOPHILUS, Smith.
TRYPOXYLON, Latreille.
T. politum, Say.
=albitarse, Auct.
=neglectum, Kohl.
T. albipilosum, Fox.
T. excavatum, Say.
T. projectum, Fox.
T. apicalis, Fox.
T. frigidum, Smith.
T. bidentatum, Fox.
T. rubricinctum, Pack.
T. rufozonalis, Fox.
T. arizonense, Fox.
T. californicum, Sauss.
T. spinosum, Cam., ♀ ♂.
T. texense, Sauss.
T. collinum, Smith.
T. carinatum, Say.
T. Johnsonii, Fox.
T. ornatipes, Fox.
T. fastigium, Fox.
T. pennsylvanicum, Sauss.
T. striatum, Prov.
T. sulcus, La Munyon.
T. unicolor, Beauv.
T. centrale, Cam.
T. cinereum, Cam.
T. mexicanum, Sauss.
T. aztecum, Sauss.
T. lactitarse, Sauss.
T. luteitarse, Sauss.
T. carinifrons, Cam.
T. fulvispina, Cam.
T. fulvipes, Cam.
T. balteatum, Cam., ♀.
T. apicipenne, Cam.
T. cinereo-hirtum, Cam., ♀.
T. fasciventre, Cam., ♀.
T. sonorense, Cam.
T. cornigerum, Cam.
T. chichimecum, Sauss.
T. toltecum, Sauss.
T. palliditarse, Cam.
T. rugifrons, Cam.

FAMILY XXII.—Mellinidæ.

This family, as well as those which are to follow, is distinguished from all of the preceding families *by having two apical spurs on the middle tibiæ*. From the other families having this character in common, namely, the Nyssonidæ, Stizidæ, Sphegidæ, and Ampulicidæ, it could only be confused with the family Nyssonidæ, subfamily Gorytinæ.

Unquestionably, the Mellinidæ and the Nyssonidæ have had a common origin and are exceedingly closely allied, but I believe both exhibit certain structural peculiarities, of taxonomic value, that justify one in keeping them separate and in treating them as distinct families.

In the Mellinidæ the first abdominal segment is usually long, petioliform, and coarctate, *or always with a decided constriction between the first and second segments*, the intermediate coxæ are contiguous, while the mesosternal suture is usually entirely wanting. In the Nyssonidæ, on the

contrary, the first abdominal segment may be long, but it is never coarctate, and there is never a constriction between it and the second segment, the middle coxæ are not quite so close together, and, as a rule, the *mesosternal suture is distinct* or *represented by a strong carina which separates the mesosternum from the mesopleura*. If this last character is not present, other quite distinct characters separate them.

The genera falling in this family may be distinguished by the use of the following table:

Table of Genera.

Cubitus in hind wings originating *beyond* the transverse median nervure ..... 5.

Cubitus in hind wings *interstitial* with the transverse median nervure ..... 4.

Cubitus in hind wings originating *before* the transverse median nervure.

Front wings with the second cubital cell receiving both recurrent nervures ..... 2.

Front wings with the first and third cubital cells each receiving a recurrent nervure; submedian cell a little shorter than the median ..... Mellinus, Fabr.

2. Submedian cell a little longer than the median ..... 3.

Submedian and median cells equal, the transverse median nervure *interstitial* with the basal nervure, stigma not well developed, the radius originating from its apex ..... Harpactostigma, Ashm., n. g.
(Type H. velutinus, Spin.)

3. Stigma well developed, rounded off at apex, the radius originating before its apex or near the middle, eyes very large, strongly convergent anteriorly on the clypeus.

First recurrent nervure received by the second cubital cell at its middle; abdomen with the dorsal segments depressed at apex ..... Entomosericus, Dahlb.

First recurrent nervure received by the second cubital cell before the middle; abdomen with the dorsal segments not depressed at apex, normal ..... Megalomma, Smith.

4. Stigma only moderately developed, the radius originating from its apex; submedian cell a little longer than the median; second cubital cell receiving both recurrent nervures; triangular area of metathorax well defined, striated; scutellum with a crenulate furrow across the base ..... Hypomellinus, Ashm., n. g.
(Type G. rufocinctus, Fox.)

5. Front wings with the second cubital cell receiving both recurrent nervures ..... 6.

Front wings with the first and second cubital cells each receiving a recurrent nervure, or the first recurrent is interstitial with the first transverse cubitus; stigma well developed, the radius originating from its middle; median and submedian cells equal, the transverse median nervure interstitial with the basal; tibiæ stout, clavate, spinous, the inner spur of hind tibiæ dilated..... Euspongus, Lepel.

6. Submedian and median cells equal; stigma large or well developed, the radius originating before its apex; hind tibiæ short, stout, spinous, the tarsi of normal length..... Olgia, Radz.

Submedian cell a little longer than the median; stigma not well developed, the radius originating from its apex; ♀ with a distinct tarsal comb; hind legs long, their tarsi fully twice as long as the tibiæ.

Head with the eyes not convergent on the clypeus, but convergent posteriorly; abdomen not or scarcely longer than the head and thorax united, the first segment strongly coarctate, dorsal segments *without* white pubescent bands at apex..... Mellinogastra, Ashm., n. g. (Type G. mellinoides, Fox.)

Head with the eyes convergent on the clypeus, divergent posteriorly; abdomen longer than the head and thorax united, the first segment long, petioliform, subcoarctate, the dorsal segments banded with a whitish pubescence at apex..... Hapalomellinus, Ashm., n. g. (Type G. eximius, Prov.)

North American Species.

(1) Mellinus, Fabr.
  (1) M. abdominalis, Cr., ♀ ♂.
  (2) M. bimaculatus, Pack., ♀ ♂.
  (3) M. rufinodus, Cr., ♀ ♂.
  (4) M. pygmaeus, Handl., ♀ ♂.
  (5) M. alpestris, Cam., ♀.
  (6) M. obscurus, Hdl., ♀.
(2) Harpactostigma, Ashmead.
(3) Entomosericus, Dahlbom.
(4) Megalomma, Smith.
(5) Hypomellinus, Ashmead.
  (1) H. rufocinctus, Fox, ♀.
  (2) (?) H. piceus, Hdl., ♂.
(6) Euspongus, Lepeletier.
  (1) E. bipunctatus, Say., ♀ ♂.
  (2) E. Championi, Cam., ♀.
(7) Olgia, Radoszkowski.
(8) Mellinogastra, Ashmead.
  (1) M. mellinoides, Fox, ♀.
(9) Hapalomellinus, Ashmead.
  (1) H. eximius, Prov., ♀ ♂.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 6.)

Family XXIII.—Nyssonidæ.

Anyone with the use of my table of families ought readily to recognize any wasp falling in this family, and especially after reading my remarks under the family Mellinidæ. The only group that could possibly cause trouble or confusion would be the subfamily *Gorytinæ*, which closely resembles the *Mellinidæ*, but which may be easily separated from the latter by paying close attention to the shape of the first abdominal segment and examining the mesopleura for the mesosternal suture or carina.

The family Nyssonidæ may be divided into four distinct groups, which I have designated as subfamilies, and which are easily distinguished by the characters made use of in the following table :

Table of Subfamilies.

Marginal cell always pointed at apex, never truncate, and without an appendage; antennæ inserted far above the clypeus, always away from the clypeal suture.

Front wings with the second cubital cell broadly sessile, never triangular or petiolate, and receiving both recurrent nervures; mesopleural furrow usually deeply and sharply defined, complete ..... Subfamily I., Gorytinæ.

Front wings with the second cubital cell petiolate, rarely triangular, sessile; mesopleural suture wanting or subobsolete, evanescent posteriorly.

Metathorax with the superior hind angles unarmed, rounded or obtuse; pronotum dorsally not short, subquadrate; forms elongate ..... Subfamily II., Alysoninæ.

Metathorax with the superior hind angles always acute or produced into stout teeth or spines; pronotum dorsally short, narrowly transverse; forms broad, robust ..... Subfamily III., Nyssoninæ.

Marginal cell always broadly truncate at apex, with an appendage; antennæ inserted close to the clypeus, or very close to the clypeal suture ..... Subfamily IV., Astatinæ.

Subfamily I.—Gorytinæ.

This subfamily approaches nearest to the Mellinidæ and is the only one that could possibly be confused with it. The characters of the first abdominal segment and of the mesopleura, already pointed out, will, however, readily separate it from the Mellinidæ.

From the other subfamilies, into which this family is divided, it is separated by the *sessile second cubital cell*, and, as a rule, by the distinct mesosternal suture.

The genera are somewhat numerous and closely allied, but may be distinguished by the use of the following table :

Table of Genera.

Mesosternum not separated from the mesopleura by a longitudinal suture or carina, the latter entirely wanting or indicated only slightly anteriorly ; cubitus in hind wings originating *beyond* the transverse median nervure, very rarely interstitial or nearly.....4.

Mesosternum always distinctly separated from the mesopleura by a longitudinal suture or carina (sometimes difficult to discern on account of the pubescence).

Cubitus in hind wings originating *before* the transverse median nervure, or interstitial or nearly.....2.

Cubitus in hind wings originating *far beyond* the transverse median nervure ; stigma not well developed, the radius originating from its apex.....3.

2. Cubitus in hind wings originating *far* before the transverse median nervure.

Triangular area of metanotum sharply defined by grooved lines, the enclosure smooth, polished, not striate, or at most only slightly striate laterally at base. ...Pseudoplisus, Ashm., n. g. (Type G. floridanus, Fox.)

Cubitus in hind wings interstitial or originating only a little before the transverse median nervure.

Cubitus in hind wings most frequently originating a little before the transverse median nervure ; triangular area of metanotum always well defined, the enclosure always longitudinally striate.....Hoplisus, Lepel.

Cubitus in hind wings *interstitial;* triangular area of metanotum not sharply defined, but striate or coarsely rugose.....Hoplisoides, Gribodo.

3. Submedian cell longer than the median ; second cubital cell receiving both recurrent nervures ; anterior tarsi in ♀ with a comb ; triangular area of metathorax well defined, with some striæ at base..... Harpactus, Jurine.
= Dienoplus, Fox.

4. Second cubital cell not receiving both recurrent nervures ; hind tibiæ serrate ..... 8.

Second cubital cell receiving both recurrent nervures, or rarely with the first recurrent interstitial with the first transverse cubitus ; hind tibiæ not serrate, although sometimes spinous.

Stigma not well developed, truncate at apex, the radius originating from its extreme apex..... 7.

Stigma well developed, not truncate at apex, the radius originating before its apex ..... 5.

5. Anterior tarsi in ♀ *with* a comb.. ..... 6.

Anterior tarsi in ♀ *without* a comb ; cubitus in hind wings originating far *beyond* the transverse median nervure.

First ventral segmemt *without* a carina or elevation, the second without an emargination at base, when viewed from the side, normal, not elevated..... Kaufmannia, Radoszk.

First ventral segment *with* a carina or elevation, the second abruptly truncate or with an emargination at base and elevated, so as to appear triangular when viewed from the side..... Gorytes, Latreille.

6. Transverse median nervure in front wings joining the median vein far *beyond* the origin of the basal nervure..... Lestiphorus, Lepel.

Transverse median nervure in front wings *interstitial* with the basal nervure.

Body marked with yellow; first abdominal segment above convex ; scutellum with a transverse impressed line at base, but the same not crenulate..... Clitemnestra, Spinola.

Body wholly black ; first abdominal segment with a hump-like elevation above ; scutellum *with* a transverse, crenulate furrow at base. (New Zealand)..... Argogorytes, Ashm., n. g.
(Type G. carbonarius, Smith.)

7. Submedian cell in front wings longer than the median ; antennæ filiform or subclavate ; pulvilli normal ; abdomen mostly rufous.

Cubitus in hind wings originating distinctly beyond the transverse median nervure ..... Harpactus, Jurine.

Cubitus in hind wings *interstitial* with the transverse median nervure ..... Agraptus, Wesmael.

8. First recurrent nervure *interstitial* or nearly, the second recurrent received by the second cubital cell near its apex; anterior tarsi in ♀ *without* a comb.....Miscothyris, Smith.

SUBFAMILY II.—Alysoninæ.

This is a natural group, of small extent, and represented by only two genera, found in both hemispheres.

The species are somewhat narrowed and elongate, and superficially resemble the *Pseninæ*, in the family Pemphredonidæ, although structurally they are widely separated.

Our species have been monographed recently by Mr. Wm. J. Fox.

The genera may be distinguished as follows:

Table of Genera.

Submedian cell in front wings much longer than the median, the transverse median nervure joining the median vein far *beyond* the origin of the basal nervure; abdomen with a pale spot at each side of the second segment.....Didineis, Wesmael.

Submedian cell of front wings a little shorter than the median, the transverse median nervure joining the median vein a little *before* the basal nervure; abdomen without a pale spot on each side of the second segment..... Alyson, Jurine.

SUBFAMILY III.—Nyssoninæ.

This is also a natural and compact group, allied to the *Alysoninæ*, but markedly distinct in the more robust form and by the toothed metathoracic angles. In this last characteristic it shows some affinity with the Stizidæ, but otherwise—in mouth-parts, venation of wings, and in its thoracic characters—the subfamily is quite distinct and easily separated.

Our species in this group have been monographed recently by Mr. Wm. J. Fox, who, however, has suppressed all genera and placed all our species in the genus *Nysson*, Latr. Mr. Fox's work is excellent, but I do not believe in such wholesale lumping, and in the following table I have restored all of these genera, making use of such salient characters as I believe will render their recognition easy and certain.

Table of Genera.

Front wings with two cubital cells, the third transverse cubitus always wanting..... 5.

Front wings with three cubital cells, the second always petiolate; if with only two cubital cells, the second transverse cubitus wanting.

Two cubital cells, the first receiving both recurrent nervures.....3.
Three cubital cells.....2.

2. Second cubital cell receiving only one recurrent nervure.....4.
Second cubital cell receiving both recurrent nervures.

Cubitus in hind wings originating *before* the transverse median nervure or interstitial with it; hind tibiæ usually spinous, but not serrate on hind margin; scutellum normal; apex of abdomen in ♂ terminating in 2 teeth.....Nysson, Latreille.

Cubitus in hind wings originating beyond the transverse median nervure.

Hind tibiæ with feeble spines, never serrate; lateral margins of scutellum sometimes more or less margined, the postscutellum normal; apex of ♂ abdomen terminating in 2 teeth.....Brachystegus, Costa.

Hind tibiæ strongly *serrated* on hind margin, and also more or less spinous; lateral margins of scutellum more or less strongly reflexed, the postscutellum bilobed; apex of ♂ abdomen terminating in 4 teeth.....Paranysson, Guerin.

3. Cubitus in hind wings originating *beyond* the transverse median nervure, the latter short, straight, perpendicular; hind tibiæ on outer face armed with 4 teeth; pygidium very long, with the lateral margins denticulate.....Metanysson, Ashm., n. g.
(Type N. Solani, Ckll.)

4. Second cubital cell receiving only one recurrent nervure—*the second*, the first recurrent nervure received by the first cubital cell near its apex; posterior coxæ armed with a spine or tubercle at apex; abdomen normal.....Helioryctes, Smith.
(Type H. melanopyga, Smith.)

Second cubital cell receiving only one recurrent nervure—*the first*, the second recurrent nervure received by the third cubital cell far beyond the second transverse cubitus; posterior coxæ unarmed; hind tibiæ and scutellum as in *Nysson;* abdomen with ventral segments 4–6 each with a lateral tooth, apex of abdomen in ♂ 3-dentate.....Foxia, Ashm.

5. Second cubital cell triangular, but not petiolate, the first recurrent nervure received by the first cubital cell near its apex, the second recurrent interstitial; metathorax with the superior hind angles produced into strong stout spines.....Acanthostethus, Smith.

Second cubital cell petiolate, receiving both recurrent nervures; metathoracic teeth small, acute; scutellum normal; legs smooth, not spinous..... Hyponysson, Cresson.

SUBFAMILY IV.—Astatinæ.

Distinguished from all the other subfamilies by the truncate, appendiculate marginal cell in the front wings, and by the antennæ being inserted far anteriorly, close to the clypeal suture.

Fox has correctly pointed out the close relationship between his genus *Diploplectron* and *Dinetus*, Jurine, but both genera are too closely related to *Astatus* to warrant their separation as a distinct tribe.

Four genera fall into this group, separated as follows:

Table of Genera.

Marginal cell along the costa, much longer than the stigma; eyes in ♂ holoptic; front wings with three cubital cells..... 3.

Marginal cell, along the costa not longer than the stigma, most frequently shorter; eyes in ♂ normal, not holoptic.

Front wings with three cubital cells..... 2.

Front wings with two cubital cells.

Clypeus at apex in ♀ 3-dentate; tarsal comb distinct; all tibiæ spinous: antennæ in ♂ twisted, the scape much swollen, the flagellar joints 1–6 compressed; anterior tarsi flattened..... Dinetus, Jurine.

2. Clypeus medially convex, slightly produced anteriorly, without teeth; tarsal comb long, distinct; tibiæ spinous; antennæ filiform, similar in both sexes..... Diploplectron, Fox.

3. Second cubital cell not receiving both recurrent nervures, the first recurrent nervure *interstitial* with or received a little before the first transverse cubitus; marginal cell not quite twice as long as wide; eyes in ♂ *not* extending to base of mandibles; pronotum in ♀ strongly developed and not hidden beneath the anterior margin of the mesonotum; first cubital cell much longer than the second or third, nearly as large as both united..... Dryudella, Spinola.

Second cubital cell receiving both recurrent nervures; marginal cell at least twice as long as wide, and still longer in the ♂; eyes in ♂ extending to the base of mandibles; pronotum in both sexes deeply impressed beneath the anterior margin of the mesonotum; first cubital cell only slightly different from the second or third..... Astatus, Latreille.

North American Species.

Subfamily I.—*Gorytinæ*.

(1) Pseudoplisus, Ashmead.
- (1) P. abdominalis, Cr., ♀ ♂.
  = propinquus, Cr.
- (2) P. aequalis, Hdl., ♀ ♂.
- (3) P. alpestris, Cam., ♀ ♂.
- (4) P. alticola, Cam., ♀ ♂.
- (5) P. balteatus, Cam., ♀.
- (6) P. bipartitus, Hdl., ♀ ♂.
- (7) P. cameronis, Hdl., ♀ ♂.
- (8) P. centralis, Cam., ♀.
- (9) P. divisus, Smith, ♂.
- (10) P. fasciatus, Fox, ♀.
- (11) P. floridanus, Fox, ♀.
  = foveolatus, Fox.
- (12) P. fulvipennis, Smith.
- (13) P. fuscipennis, Cam., ♀
- (14) P. montanus, Cam., ♂.
- (15) P. notabilis, Hdl., ♀ ♂.
- (16) P. phaleratus, Say, ♀ ♂.
  = flavicornis, Pack.
  = modestus, Cr.
  = rufoluteus, Pack.
- (17) P. rubiginosus, Hdl., ♀ ♂.
- (18) P. Smithii, Cr., ♀.
- (19) P. splendidus, Hdl., ♀.
- (20) P. venustus, Cr., ♀ ♂.

(2) Hoplisus, Lepeletier.
- (1) H. albosignatus, Fox.
- (2) H. angustatus, Prov.
- (3) H. atricornis, Pack, ♂.
- (4) H. atrifrons, Fox, ♀ ♂.
- (5) H. canaliculatus, Pack.
- (6) H. cayenensis, Spin., ♀ ♂.
- (7) H. compactus, Fox.
- (8) H. decorus, Fox, ♀ ♂.
- (9) H. diversus, Fox, ♀.
- (10) H. fasciatipennis, Cam., ♀.
- (11) H. fuscus, Tischb., ♀ ♂.
- (12) H. geminus, Hdl., ♀ ♂.
- (13) H. maculipes, Cam.
- (14) H. nevadensis, Fox, ♀ ♂.
- (15) H. Provancheri, Hdl., ♂.
  = laticinctus, Prov.
- (16) H. ruficornis, Prov., ♀ ♂.
- (17) H. simillimus, Smith, ♀ ♂.
  = eppipiata, Prov.
- (18) H. vicinus, Hdl.

(3) Hoplisoides, Gribodo.
- (1) H. armatus, Prov.
- (2) H. asperatus, Fox.
- (3) H. bigeloviæ, Ckll.
- (4) H. barbatulus, Hdl., ♂.
- (5) H. confertus, Fox.
- (6) H. Coquiletti, Fox.
- (7) H. costalis, Cr.
- (8) H. dentatus, Fox.
- (9) H. denticulatus, Pack.
- (10) H. gracilis, Pattn.
- (11) H. hamatus, Hdl., ♂.
  = micantula.
- (12) H. laminiferus, Fox, ♂.
- (13) H. maculipennis, Cam.
- (14) H. mexicanus, Cam., ♀.
- (15) H. microcephalus, Hdl.
- (16) H. mirandas, Fox.
- (17) H. nebulosus, Pack.
- (18) H. Pergandii, Hdl.
- (19) H. placidus, Smith.
  = rufipes, Sm
- (20) H. punctifrons, Cam.
- (21) H. pygidialis, Fox, ♀.
- (22) H. robustus, Hdl., ♀.
- (23) H. rugosus, Pack.
- (24) H. seminiger, Dahlb.
- (25) H. scitulus, Cr.
- (26) H. sepulchralis, Hdl.
- (27) H. spilopterus, Hdl.
- (28) H. tricolor, Cress., ♀ ♂.

(4) Harpactus, Jurine.
  = Dienoplus, Fox.
- (1) H. Cockerellii, Ashm., ♀.
- (2) H. Howardii, Ashm., ♀.
- (3) H. insularis, Cr.
- (4) H. lateritius, Hdl., ♀ ♂.
- (5) H. mendicus, Hdl., ♀ ♂.
  = pictifrons, Fox.
- (6) H. tristrigatus, Fabr., ♀ ♂.

(7) H. (?) insolitus, Fox, ♂. (Gorytes.)
(5) KAUFMANNIA, Radoszk.
(6) GORYTES, Latreille.
(1) G. campestris, Linné, ♀ ♂.
(2) G. costalis, Cr., ♀
(3) G. mystaceus, L., ♀ ♂.
(4) G. nigrifrons, Smith, ♀ ♂.
(5) G. (?) piceus, Hdl., ♂.
(6) G. (?) spilographus, Hdl.
(7) LESTIPHORUS, Lepel.
(8) CLITEMNESTRA, Spinola.
(9) ARGOGORYTES, Ashmead.
(10) AGRAPTUS, Wesmael.
(11) MISCOTHYRIS, Smith.

Subfamily II.—*Alysoninæ.*

(12) DIDINEIS, Wesmael.
(1) D. aculeata, Cr., ♂. (Alyson.)
(2) D. nodosa, Fox, ♂.
(3) D. peculiaris, Fox, ♀ ♂.
(4) D. solidescens, Scudd. (Fosil.)
(5) D. texana, Cr., ♀ ♂.
(13) ALYSON, Jurine.
(1) A. conicus, Prov., ♂.
(2) A. Guignardii, Prov., ♀ ♂.
(3) A. melleus, Say, ♀ ♂.
(4) A. oppositus, Say, ♀ ♂.
(5) A. radiatus, Fox, ♀ ♂.
(6) A. striatus, Fox, ♂.
(7) A. triangularis, Fox.
(8) A. triangulifer, Prov., ♂.

Subfamily III.—*Nyssoninæ.*

(14) NYSSON, Latreille.
(1) N. spinosus, Forst., ♀ ♂.
(2) N. plagiatus, Cr., ♀ ♂.
(3) N. Frey-Gessneri, Hdl., ♀ ♂.
(4) N. auronotatus, Say, ♀ ♂.
(5) N. aequalis, Pattn., ♀ ♂.
(6) N. compactus, Cr., ♀ ♂.
(7) N. subtilis, Fox, ♂.
(8) N. rusticus, Cr., ♀ ♂.
(9) N. simplicicornis, Fox, ♂.
(10) N. lateralis, Pack., ♂.
(11) N. tristis, Cr., ♂.
(12) N. fidelis, Cr., ♀ ♂.
(13) N. rufiventris, Cr., ♀ ♂.
(14) N. nigripes, Prov., ♂.
(15) N. quinquespinosus, Say, ♀ ♂.
(16) N. zapotecus, Cr., ♀.
(17) N. Aztecus, Cr., ♀.
(15) BRACHYSTEGUS, Costa.
(1) B. opulentus, Gerst., ♀ ♂.
(2) B. mellipes, Cr., ♀ ♂.
(3) B. bellus, Cr., ♀.
(4) B. tuberculatus, Handl., ♀ ♂
(5) B. basilaris, Cr., ♀.
(6) B. pumilus, Cr., ♂.
(7) B. albomarginatus, Cr., ♀ ♂
(8) B. moestus, Cr., ♀.
(16) PARANYSSON, Guérin.
(1) P. texanus, Cr., ♀ ♂.
(2) P. fuscipes, Cr., ♀ ♂.
(3) P. mexicanus, Cr., ♀ ♂.
(4) P. dives, Handl., ♀ ♂.
(5) P. armatus, Cr., ♀ ♂.
(17) METANYSSON, Ashmead.
(1) M. Solani, Ckll.
(18) HELIORYCTES, Smith.
(19) FOXIA, Ashmead.
(1) F. pacifica, Ashm., ♀ ♂.
(20) ACANTHOSTETHUS, Smith.
(21) HYPONYSSON, Cresson.
(1) H. bicolor, Cr., ♀.

Subfamily IV.—*Astatinæ.*

(20) DINETUS Jurine.
(21) DIPLOPLECTRON, Fox.
(1) D. ferrugineus, Ashm., ♀.
(2) D. brunneipes, Cr., ♀ ♂.
(3) D. bidentatus, Ashm., ♀.
(4) D. Foxii, Ashm., ♀.
(22) DRYUDELLA, Spinola.
(23) ASTATUS, Latreille.
(1) A. unicolor, Say, ♀ ♂.
(2) A. occidentalis, Cr., ♀ ♂.
(3) A. Leustromi, Ashm., ♀.
(4) A. nubeculus, Cr., ♀ ♂. = nigrospilosus, Cr.
(5) A. asper, Fox, ♀ ♂.
(6) A. bicolor, Say, ♀ ♂.
(7) A. pygidialis, Fox, ♀.
(8) A. nevadicus, Cr., ♀ ♂.

(9) A. montanus, Cr., ♀.
(10) A. elegans, Cr., ♀ ♂.
(11) A. bellus, Cr., ♂.
(12) A. coeruleus, Cr., ♂.
(13) A. albovillosus, Cam., ♀.
(14) A. Sayi, Fox, ♀.
(15) A. strigosa, Kohl, ♀.
(16) A. apicipennis, Cam.
(17) A. tinctipennis, Cam., ♀.
(18) A. Kohlii, Cam., ♀.
(19) A. picta, Kohl, ♂.
(20) A. mexicana, Cr., ♂.
(21) A. alpestris, Cam., ♀.
(22) A. insularis, Cr., ♀.

TABLES FOR THE DETERMINATION OF THE GENERA OF COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

(*Continued from page 279.*)

LECANIINÆ.

Secretion of ♀ more or less cottony.....Series I.
Secretion of ♀ waxy, glassy, or horny.....Series II.
Adult ♀ naked, or covered only by a film of secretion.....Series III.

Of course it must be understood that the expressions "glassy," "horny," and "cottony," refer only to the *appearance* of the secretion, not to its true nature.

SERIES I.

Female resembling a flat *Lecanium*, secreting an ovisac, which is elongated posteriorly, but does not at all cover the insect.....1.
Female surrounded by cottony secretion, but naked dorsally.....4.
Female completely or almost completely covered by a sac of cottony or felted secretion.....5.
Female secreting dorsally a thick mass of white waxy threads, which however do not cover the middle of the back; round the sides are threads spreading in all directions; antennæ six-jointed, 3 much the longest; legs rather slender; tibia longer than tarsus.....*Ceronema*, Mask.
Female oval or elliptical, with a loosely felted secretion, especially in the second stage, but absent or inconspicuous in the adult; antennæ 7-jointed: tarsus longer than tibia; margin with a fringe.....*Eriochiton*, Mask.

1. Female triangular, ovisac very slightly developed, a mere fringe round the hind margin.....*Protopulvinaria*, Ckll.
Female oval or suboval.....2.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 7.—Conclusion.)

FAMILY XXIV.—Stizidæ.

This family has been associated usually, as a tribe, with the family *Bembicidæ*, with which, however, according to my views, it has no relationship whatever. It is in reality much closer allied to the *Nyssonidæ*, next to which I have placed it, and from which some of the species are separated with difficulty.

The characters made use of in my table of families will, however, I think, readily separate these three families, and it is unnecessary to repeat them here.

Gorytes moneduloides, Packard, belongs to this family and not to the *Nyssonidæ*, and, as well as I can make out from the description, represents Costa's genus *Ammatomus*. Its entire habitus—the large eyes, the free, almost semicircular labrum, etc.—is that of a Stizid and not of a Nyssonid, and I feel satisfied it belongs here, although, not having seen an authentic specimen of *Ammatomus*, Costa, I may be wrong in assigning it to that genus.

Exeirus, Shuckard, and *Kohlia*, Handlirsch, are included in this family from the descriptions and figures alone, since both are unknown to me in nature.

The genera *Stizoides*, Guerin, and *Megastizus*, Patton, were suppressed by Handlirsch and Kohl, and included with *Stizus*, Latreille. Fox has followed them in this, but, according to my views, all these are good and distinct genera, and I have here restored *Stizoides* and *Megastizus* to their original standing.

It is believed that the following table will enable the student to recognize all of these genera without any difficulty:

Table of Genera.

Marginal cell much shorter than the first cubital cell, rounded at apex; pygidial area in ♀ wanting or incompletely defined; abdomen in ♂ ending in 3 spines.....4.

Marginal cell as long or much longer than the first cubital cell.

Second cubital cell *not* petiolate, receiving both recurrent nervures. 2.
Second cubital cell petiolate, oblong, in outline almost elliptical, and receiving both recurrent nervures; cubitus in hind wings originating a little beyond the transverse median nervure or almost interstitial ..... Exeirus, Shuckard.

2. Marginal cell lanceolate, *without* an appendage; submedian cell longer than the median ..... 3.
Marginal cell at apex slightly rounded, *with* an appendage; submedian cell a little shorter than the median.
First transverse cubitus broken by a stump of a vein a little before the middle; hind wings with the cubitus originating much before the transverse median nervure. Kohlia, Handlirsch.

3. Marginal cell almost twice as long as the first cubital cell, or at least one and a half times as long; pygidial area in ♀ distinct, triangular; anterior tarsal joints 2–4 short, transverse.
Cubitus in hind wings originating from about the apical third of the submedian cell; second cubital cell, along the cubitus, fully four times or more longer than along the radius; antennæ longer than the head and thorax united, subclavate; abdomen in ♂ ending in a single spine. Species large.. Sphecius, Dahlbom.
Cubitus in hind wings originating from the apical sixth of the submedian cell; second cubital cell, along the cubitus, scarcely three times as long as along the radius; antennae shorter than the head and thorax united, strongly clavate; abdomen in ♂ ending in two short teeth ..... Ammatomus, Costa.
Marginal cell not much longer than the first cubital cell; cubitus in hind wings originating a little before the transverse median nervure, or almost interstitial; abdomen in ♂ unarmed (♀ unknown) ..... Handlirschia, Kohl.

4. Cubitus in hind wings originating far *before* the transverse median nervure, or never beyond the apical third of the submedian cell; mandibles simple; intermediate tarsi longer than their tibiæ, the joints 3–4 short, lobed; claws long, the pulvilli moderate ..... Stizoides, Guerin.
Cubitus in hind wings originating at about the apical fifth of the submedian cell; mandibles dentate or simple.

Anterior and intermediate tarsi short, not longer than their tibiæ, the joints 2–4 very short, wider than long, and lobed ; the pulvilli very large ; posterior face of metathorax not deeply impressed, the lateral angles not sharp, rounded and without a deep emargination ; last joint of antennæ in ♂ slightly bent, truncate at apex, the antepenultimate and penultimate joints normal.....Megastizus, Patton.

Anterior and intermediate tarsi always distinctly longer than their tibiæ, the joints 2–4 short, but, except sometimes the fourth, not lobed ; posterior face of metathorax deeply impressed, the lateral angles or ridges sharp, and with a deep emargination ; second cubital cell triangular, always narrowed to a point or nearly above, and often petiolate ; last two joints of antennæ in ♂ curved, the last pointed or ending in a slight spine, the antepenultimate joint *beneath at apex*, ending in a small spine.....Stizus, Latreille.

= Bembecinus, Costa.

= Stizomorpha, Costa.

North American Species.

(1) Exeirus, Shuckard.

(2) Kohlia, Handlirsch.

(3) Sphecius, Dahlbom.

(1) S. speciosus, Drury, ♀ ♂.

(2) S. corvallis, Patt., ♀ ♂.

(3) S. Hogardii, Latr., ♀ ♂.

(4) S. grandis, Say, ♀ ♂.

(5) S. fervidus, Cr., ♀ ♂.

(6) S. nevadensis, Cr., ♀.

(7) S. raptor, Handl.

(4) Ammatomus, Costa.

(1) A. moneduloides, Pack. (Gorytes) ♀ ♂.

(5) Handlirschia, Kohl.

(6) Stizoides, Guerin.

(1) S. unicincta, Say, ♀ ♂.

(7) Megastizus, Patton.

(1) M. brevipennis, Walsh, ♀ ♂

(2) M. texanus, Cr., ♀ ♂.

(8) Stizus, Latreille.

(1) S. Godmani, Cam.

(2) S. nanus, Handl.

(3) S. flavus, Cam. var. subalpinus, Ckll.

(4) S. Servillei, Lepel.

(5) S. xanthochrous, Handl.

(6) S. moneduloides, Cr., ♀ ♂.

(7) S. neglectus, Smith, ♂.

(8) S. lineatus, Cr., ♂.

Family XXV.—Sphegidæ.

This family is readily distinguished from all of the previously

described families in the Sphegoidea, by having the abdomen distinctly petiolated, and the totally different habitus.

In having a petiolate abdomen it agrees with the family *Ampulicidæ*, but otherwise it is quite distinct, and is readily separated from it by the normally shaped mesosternum, which is never produced posteriorly into a forked process, and by the clypeus not being produced posteriorly between the antennæ, the latter being always inserted *above* the base of the clypeus.

The family, as here restricted, may be separated into four natural groups, which I have designated as subfamilies, and which may be recognized by the use of the following table:

Table of Subfamilies.

Second cubital cell receiving both recurrent nervures, or the second recurrent nervure is interstitial *with* the second transverse cubitus, although sometimes the first recurrent is interstitial with the first transverse cubitus, or then received by the first cubital cell; tibiæ either spinous or entirely smooth without spines.....2.

Second cubital cell receiving only one recurrent nervure—the first; second recurrent nervure received by the third cubital cell, or at least beyond the second transverse cubitus; very rarely are both recurrent nervures received by the first cubital cell (Neosphex, Reed, = Pseudosphex, Tischb.).

Antennæ inserted on the middle of the face; claws with 1 to 5 teeth beneath; tibiæ *strongly spinous*, or at least never with weak or feeble spines; tarsal comb in ♀ always present; cubitus in hind wings most frequently interstitial, or nearly, with the transverse median nervure; head transverse.....Subfamily I., Spheginæ.

Antennæ inserted far anterior to the middle of the face; claws simple, *without* teeth, or at most with a single small tooth near the middle; tibiæ *smooth*, not spinous; tarsal comb in ♀ *never* present; cubitus in hind wings interstitial..Subfamily IV., Podiinæ.

2. Claws simple, *without* a tooth beneath; tibiæ more or less spinous; tarsal comb in ♀ present; abdomen most frequently very elongate, the petiole composed of *2 joints*, rarely with only *1 joint*; cubitus in hind wings usually originating *beyond* the transverse median nervure.....Subfamily II., Ammophilinæ.

Claws with a single tooth beneath, although sometimes very minute, more rarely without a tooth, the claws simple; tarsal comb in ♀ wanting; abdomen always with a 1-jointed petiole; cubitus in hind wings interstitial.

Antennæ inserted on the middle of the face; metathorax *with* a large U-shaped area above; mesopleura not longer than the height of the thorax.....Subfamily III., Sceliphroninæ.

Antennæ inserted far anterior to the middle of the face, *on* or just above an imaginary line drawn from base of eyes; metathorax *without* a large U-shaped area above; mesopleura much longer than the height of the thorax.....Subfamily IV., Podiinæ.

SUBFAMILYY I.—Spheginæ.

In this group, or subfamily, the second and third cubital cells, in the front wings, each receive a recurrent nervure, or both recurrent nervures are received by the first cubital cell; the antennae are inserted on the middle of the face; the tibiæ are strongly spinous; the anterior tarsi in the ♀ always provided with a tarsal comb; while the claws are never simple, being always armed with from 1 to 5 teeth.

Some of the genera falling in this group are quite closely allied and difficult to separate, but it is believed all can be easily separated with the use of the following table:

Table of Genera.

Front wings with three cubital cells, the second and third each receiving a recurrent nervure.....2.

Front wings with only two cubital cells, the first receiving both recurrent nervures; marginal cell short, rounded at apex; median and submedian cells equal; cubitus in hind wings originating *beyond* the transverse median nervure; claws with 2 blunt teeth beneath.....Neosphex, Reed.
= Pseudosphex, Tischb.

2. Second cubital cell wider (higher) than long.....4.
Second cubital cell as long or longer than wide (high), rhomboidal or rectangular.....3.

3. Head normal, transverse, pronotum shorter than the mesonotum or no longer; claws with 2 teeth beneath.

Clypeus anteriorly truncate, usually with a reflexed rim and without a median emargination (rarely dentate); scutellum and

postscutellum most frequently *with* a median longitudinal furrow or depression, or at least one or the other with such a furrow, rarely simple.....Sphex, Linne.

Clypeus anteriorly *with* a median emargination or incision; scutellum and postscutellum normal, *without* a median longitudinal furrow.....Isodontia, Patton.

4. Claws with only one tooth beneath.....5.
Claws with 2–5 teeth beneath.....6.

5. Species metallic blue or violaceous; marginal cell at apex narrowly rounded; cubitus in hind wings *interstitial* with the transverse median nervure; mandibles not especially long; tibiæ more sparsely and feebly spined; maxillary palpi 6-jointed; labial palpi 4-jointed.....Chlorion, Latreille.

Species, except sometimes the abdomen, not metallic; marginal cell at apex truncate or broadly rounded; cubitus in hind wings originating *beyond* the transverse median nervure; mandibles unusually long; tibiæ in ♀ strongly spined; maxillary palpi 6-jointed; labial palpi 5-jointed.....Pronaeus, Latreille.

6. Last ventral plate in ♀ compressed, almost carinate; claws with 2 teeth.....7.
Last ventral plate in ♀ convex, not compressed; claws with 2–5 teeth beneath.....8.

7. Clypeus medially produced, with a deep sinus on each side.....Palmodes, Kohl.
Clypeus obtrapezoidal, truncate anteriorly, entire; eyes within parallel.....Calosphex, Kohl.

8. Claws with 2 teeth; clypeus convex, anteriorly subemarginate medially, without a reflexed rim; anterior tarsal comb short; transverse median nervure in hind wings short..Harpactopus, Smith.
Claws with 3 to 5 teeth; clypeus subconvex, with a more or less distinct reflexed rim anteriorly; anterior tarsal comb long.

Claws with 3–4 teeth; clypeus anteriorly slightly rounded, and not at all, or only slightly, emarginate; transverse median nervure in hind wings curved or somewhat curved, the cubitus *interstitial*, or nearly, with it.....Parasphex, Smith.

Claws with 4–5 teeth; clypeus anteriorly truncate, with a median emargination; cubitus in hind wings originating *beyond* the

transverse median nervure, the latter being straight; mandibles in ♀ 3-dentate, in ♂ 2-dentate.....Priononyx, Dahlb.

SUBFAMILY II.—Ammophilinæ.

The species falling in this group are much more slender and elongate than those of the other groups, and are at once distinguished by the *simple, unarmed* claws, and by the venation of the wings; the second cubital cell in the front wings always receives both recurrent nervures, while the cubitus in the hind wings originates *beyond* the transverse median nervure. The tarsal comb in the ♀ is always present.

Two other subfamilies—*Sceliphroninæ* and *Podiinæ*—have both recurrent nervures received by the second cubital cell; but in these families the claws are armed with a tooth beneath, the tarsal comb in the ♀ is always wanting, while the cubitus in the hind wings is interstitial with the transverse median vein.

Only four genera fall into this family, distinguished as follows:

Table of Genera.

Front wings with two cubital cells.....2.

Front wings with three cubital cells; submedian cell a little shorter than the median.

Petiole of abdomen not especially long, 1-jointed, the second segment campanulate; clypeus in ♀ with a more or less distinct median emargination.....Psammophila, Dahlb.

Petiole of abdomen very long, 2-jointed, the second segment being elongate and slender, forming with the first a long petiole.

Third cubital cell not petiolate.....Ammophila, Kirby.

Third cubital cell petiolate.....Miscus, Jurine.

2. Petiole long, 2-jointed, as in *Ammophila;* submedian cell as long as the median.....Caloptera, Fabricius.

SUBFAMILY III.—Sceliphroninæ.

In having both recurrent nervures received by the second cubital cell, this subfamily approaches the *Ammophilinæ*, but it is readily separated from it by the claws having, as a rule, a single tooth beneath; by the cubitus in the hind wings being interstitial with the transverse median nervure, and by the ♀ always being without a tarsal comb.

From the *Podiinæ* it is separated by the antennæ being inserted on the middle of the face, by the large U-shaped area on the metathorax or middle segment, and by the much shorter mesopleura.

Only two genera are known, distinguished as follows :

Table of Genera.

Second submarginal cell receiving both recurrent nervures.

Species black and yellow, not metallic ; clypeus flat, at apex *bidentate;* transverse median nervure in front wings *not* interstitial with the basal nervure, but uniting with the median vein a little *before* the origin of the basal nervure ; petiole of abdomen about twice as long as the metathorax.....Sceliphron, Klug.
= Pelopœus, Latr.

Species metallic blue or violaceous ; clypeus anteriorly *3-dentate* ; transverse median nervure in front wings *interstitial* with the basal nervure ; petiole of abdomen not or scarcely longer than the metathorax..... .....Chalybion, Dahlb.

Subfamily IV.—Podiinæ.

This subfamily comes nearest to the *Sceliphroninæ*, but is at once separated by the antennæ being inserted on the anterior part of the face, *on* or *just above* an imaginary line drawn from the base of the eyes ; by the much longer mesopleura, and by the absence of a large U-shaped area on the metathorax or middle segment.

Three genera are known, separated as follows :

Table of Genera.

First and second cubital cells each receiving a recurrent nervure, or the *first* recurrent is interstitial with the *first* transverse cubitus.....2.

Second and third cubital cells each receiving a recurrent nervure, or the *second* recurrent is interstitial with the *second* transverse cubitus.....3.

Second cubital cell receiving both recurrent nervures..Podium, Fabricius.

2. Second cubital cell wider than long ; hind femora, in both sexes, normal, the basal joint of their tarsi much shorter than their tibiæ ; petiole long or longer than the metathorax...Podium, Fabr. (pars.)
Second cubital cell longer than wide ; hind femora in ♀ dilated at apex, their tibiæ shortened, the basal joint of their tarsi as long, or nearly, as the tibiæ; petiole shorter than the metathorax.Stethrorectus,Smith.

3. Head in outline as seen from above, triangular, much produced behind, the temples oblique, but broad ; pronotum conically produced, longer than the meso- and meta-notum...Trigonopsis, Perty.

North American Species.

(1) NEOSPHEX, Reed.
= Pseudosphex, Tischb.

(2) SPHEX, Latreille.
(1) S. argentata, Dahlb.
(2) S. aurulentus, Fabr.
(3) S. beatus, Cam., ♂.
(4) S. Belfragei, Cr., ♀.
(5) S. brasiliensis, Sauss., ♀.
? = tinctipennis, Cam.
(6) S. caliginosus, Erich.
(7) S. chichimecus, Sauss., ♂.
(8) S. chrysophorus, Kohl.
(9) S. clavipes, Kohl., ♀.
(10) S. croesus, Lepel.
(11) S. crucis, Fabr.
(12) S. dubitatus, Cr.
(13) S. flavipes, Smith.
(14) S. habena, Say.
(15) S. ichneumonea, Linné.
var. dorsalis, Lepel.
(16) S. lautus, Cr.
(17) S. mandibularis, Cr.
(18) S. Maximiliani, Kohl.
(19) S. mixtus, Fabr.
(20) S. pennsylvanicus, Linné.
(21) S. rufipes, Lepel.
(22) S. singularis, Smith.
(23) S. spiniger, Kohl., ♂.
(24) S T, Beauv.
(25) S. tepanecus, Sauss.
(26) S. texanus, Cr.
(27) S. vagus, Drury.

(3) ISODONTIA, Patton.
(1) I. azteca, Sauss.
= macrocephalus, Fox.
(2) I. costipennis, Spin.
(3) I. elegans, Smith.
(4) I. instabilis, Smith.
(5) I. lucæ, Sauss.
(6) I. philadelphica, Lepel.
(7) I. robusta, Cam.
(8) I. tibialis, Lepel.

(4) CHLORION, Latreille.
(1) C. aerarium, Patton.
(2) C. coeruleum, Drury.
(3) C. columbianum, Grib.
(4) C. nearticum, Kohl.
= coeruleum, Auct., *pars.*
(5) C. occultum, Kohl.
= coeruleum, Auct., *pars.*

(5) PRONÆUS, Latreille.

(6) PALMODES, Kohl.
(1) P. dimidiata, DeGeer.
=abdominalis, Cr.
(2) P. morio, Kohl.
(3) P. praestans, Kohl.
(4) P. rufiventris, Cr.

(7) CALOSPHEX, Kohl.

(8) HARPACTOPUS, Smith.
H. laeviventris, Cr.

(9) PARASPHEX, Smith.

(10) PRIONONYX, Dahlbom.
(1) P. atratus, Lepel.
(2) P. bifoveolatus, Tischb.
= canadensis, Prov.
= thomæ, Fabr., *pars.*
(3) P. brunneipes, Cr.
(4) P. excisus, Kohl.
(5) P. ferruginosus, Fox.
(6) P. thomæ, Fabr.

Subfamily II—*Ammophilinæ.*

(11) Psammophila, Dahlbom.
- (1) P. argentifrons, Cr.
- (2) P. collaris, Cr.
- (3) P. communis, Cr.
- (4) P. grossa, Cr.
- (5) P. luctuosa, Smith.
- (6) P. robusta, Cr.
- (7) P. ? violaceipennis, Lepel.

(12) Ammophila, Kirby.
- (1) A. Alberti, Hald.
- (2) A. alpestris, Cam.
- (3) A. alticola, Cam.
- (4) A. anomala, Taschb, ♀ ♂.
- (5) A. arvensis, Dahlb.
- (6) A. atriceps, Smith.
- (7) A. aureonotata, Cam.
- (8) A. azteca, Cam.
- (9) A. barbata, Smith.
- (10) A. breviceps, Smith.
- (11) A. cementaria, Smith.
- (12) A. centralis, Cam.
- (13) A. ceres, Cam.
- (14) A. Championii, Cam.
- (15) A. chiriquensis, Cam.
- (16) A. comanche, Cam.
- (17) A. conditor, Smith.
- (18) A. consors, Cam.
- (19) A. cora, Cam.
- (20) A. dejecta, Cam.
- (21) A. extremitator, Cr.
- (22) A. femur-rubra, Fox.
- (23) A. ferruginosa, Cr.
- (24) A. Gaumeri, Cam.
- (25) A. gracilis, Lep.
- (26) A. Guerinii, D. T.
- (27) A. jason, Cam.
- (28) A. inepta, Cr.
- (29) A. intercepta, Lepel.
- (30) A. iridipennis, Cam.
- (31) A. juncea, Cr.
- (32) A. macra, Cr.
- (33) A. mexicana, Sauss.
- (34) A. micans, Cam,
- (35) A. montana, Cr.
- (36) A. Montezuma, Cam.
- (37) A. Morrisonii, Cam.
- (38) A. neartica, Kohl.
- (39) A. nigricans, Dahlb.
- (40) A. nigrocoerulea, Cam.
- (41) A. picipes, Cam.
- (42) A. pictipennis, Wahb.
- (43) A. placida, Smith.
- (44) A. polita, Cr.
- (45) A. procera, Dahlb.
- (46) A. pruinosa, Cr.
- (47) A. quadridentata, Cam.
- (48) A. saeva, Smith.
- (49) A. sonorensis, Cam.
- (50) A. strenua, Cr.
- (51) A. striolata, Cam.
- (52) A. trichiosoma, Cam.
- (53) A. urnaria, Dahlb.
- (54) A. valida, Cr.
- (55) A. variipes, Cr.
- (56) A. volcanica, Cam.
- (57) A. vulgaris, Cr.
- (58) A. xanthoptera, Cam.
- (59) A. Yarrowii, Cr.

(13) Miscus, Jurine.

(14) Caloptera, Fabricius.
- (1) C. Wrightii, Cr., ♀ ♂.

Subfamily III—*Sceliphroninæ.*

(15) Sceliphron, Klug.
- (1) S. cementarius, Drury.

var. canadensis, Smith.
var. architectus, Lepel.
var. lucæ, Sauss.
var. flavipes, Fabr.
var. flavipunctum, Chrisb.
var. flavimaculatum, DeGeer.
var. jamaicensis, Fabr.
(2) S. Servillei, Lepel.
(3) S. fasciatum, Lep.
= argentifrons, Cr.
(4) S. annulatum, Cr.
(5) S. assimile, Dahlb.
(6) S. argentispilus, Prov.
(7) S. tau, D. T.
(8) S. nigriventris, Costa.
(16) CHALYBION, Latreille.
(1) C. californicum, Sauss.
(2) C. coeruleum, Linné.
(3) C. texanum, Cr.
(4) C. Zimmermanni, Dahlb.
(5) C. aztecum, Sauss.

Subfamily IV—*Podiinæ*.

(17) PODIUM, Fabr.
(1) P. luctuosum, Smith.
(2) P. rufipes, Fabr.
(3) P. bellum, Cam.
(4) P. bugalense, Cam.
(5) P. fulvipes, Cr.
(6) P. opalinum, Smith.
(7) P. petiolatum, Drury.
(18) STETHRORECTUS, Smith.
(19) TRIGONOPSIS, Perty.
(1) T. violaceus, D. T.

FAMILY XXVI.—Ampulicidæ.

This family, in general appearance and in having a petiolate abdomen, is allied to the *Sphegidæ*, but is readily separated by the mesosternum being produced into a forked process posteriorly, by the mesonotum having distinct parapsidal furrows, by the clypeus being produced posteriorly between the insertion of the antennæ, often rostrate or carinate, and by its metathoracic characters.

The species, so far as we know, prey upon cockroaches, and thus differ in their habits from the *Sphegidæ*.

The family may be divided into two natural groups, which I have designated as subfamilies, and which may be distinguished by the use of the following table :

Table of Subfamilies.

Marginal cell at apex acute, *without* an appendage ; metathorax posteriorly truncate or rounded, unarmed ; clypeus not carinate.....Subfamily I., Dolichurinæ.

Marginal cell at apex rounded, *with* an appendage ; metathorax posteriorly squarely truncate, the upper angles most frequently acute or toothed ; clypeus carinate.....Subfamily II., Ampulicinæ.

SUBFAMILY I.—Dolichurinæ.

This subfamily is easily distinguished from the *Ampulicinæ* by a pointed, not truncate, marginal cell, by the non-carinate clypeus, and by the rounded, or at least unarmed, metathorax.

The group is unknown in our fauna, and is found principally in Australia, or at least in the Oriental region, only a single genus *Dolichurus* being found in Europe.

According to Kohl, *Dolichurus*, like *Ampulex*, preys upon Blattidæ, which they store up in their nests as food for their young.

Three genera fall into this subfamily, and may be recognized by the characters made use of in the following table:

Table of Genera.

Stigma not small, subovate; submedian cell shorter than the median; metanotum with foveolæ.....2.

Stigma small, poorly developed; submedian cell shorter than the median; metanotum with several longitudinal carinæ.

Third cubital cell smaller than the second, narrowed towards the radius; cubitus in hind wings originating a little *before* the transverse median nervure, or interstitial; metanotum above not broadened out laterally.....Dolichurus, Latreille.

Third cubital cell quadrangular, much longer than the second; cubitus in hind wings originating beyond the transverse median nervure; metanotum above broadened out laterally.....Trirogma, Westw.

2. Second cubital cell subtriangular, smaller than the third; cubitus in hind wings interstitial; metathorax rounded posteriorly; clypeus produced medially; claws toothed.....Aphelotoma, Westw.

SUBFAMILY II.—Ampulicinæ.

In this family the marginal cell is more or less rounded at apex, with an appendage; the clypeus is subrostriform and carinate; while the metathorax posteriorly is truncate, with the upper angles most frequently acute, toothed or produced into spines.

Kohl would restrict all the species to a single genus, *Ampulex*, Jurine, treating the others as sections; but in this I cannot follow him, since I believe these sections are really genera, to which names have already been applied.

Four genera have been recognized, and are distinguishable by the aid of the following table:

Table of Genera.

Front wings with three cubital cells; pronotum often with a tubercle at base above.....2.

Front wings with two cubital cells; pronotum never with a tubercle at base above.

Metathorax subquadrate, a little longer than wide, squarely truncate posteriorly, but the superior hind angles not produced into strong teeth, at the most with a small tubercle or tooth, the dorsum with longitudinal carinæ, the interstices transversely striate; claws with a median tooth beneath; maxillary palpi 6-, labial palpi 4-jointed; head *without* a frontal area above antennæ; submedian cell not longer than the median; first flagellar joint longer than 2–3 united; pronotum fully twice as long as wide at base.....Rhinopsis, Westw.

Metathorax quadrate, the superior hind angles more or less produced into blunt tubercles or short teeth, the dorsum sculptured as in *Rhinopsis;* claws cleft; head *with* a frontal area above the antennæ, or at least with strong lateral carinæ extending from base of each antenna backwards towards the ocelli; submedian cell a little longer than the median; first flagellar joint not longer than 2–3 united; pronotum not or only a little longer than wide at base.....Waagenia, Kriechbaumer.

2. Superior hind angles of metathorax produced into strong teeth or long spines; claws cleft.

Face normal, *without* an enclosed frontal area above the antennæ; pronotum always tuberculate; abdomen in ♀ compressed at apex; metathoracic spines very long.....Chlorampulex, Sauss.

Face with a frontal area above the antennæ, which encloses the front ocellus; pronotum more rarely tuberculate; abdomen in ♀ not compressed at apex; metathoracic spines not long.....Ampulex, Jurine.

North American Species.

FAMILY XXVI.—*Ampulicidæ.*

Subfamily I.—*Dolichurinæ.*

(1) DOLICHURUS, Latreille.

(2) TRIROGMA, Westwood.

(3) APHELOTOMA, Westwood.

Subfamily II.—*Ampulicinæ.*

RHINOPSIS, Westwood.

(1) R. canaliculata, Say., ♀ ♂. = Abbottii, Westw.

(2) R. maculicornis, Cam., ♀.

WAAGENIA, Kriechbaumer.

CHLORAMPULEX, Saussure.

AMPULEX, Jurine.

(1) A. angusticollis, Spin., ♀.