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

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(Paper No. 7.—Continued from p. 166.)

FAMILY XXIX.—Eumenidæ.

To this family belong the potter wasps. They differ from the paper-making wasps in being solitary and in constructing their nests of mud or clay, instead of macerated woody fibre or pulp. It is perhaps one of the largest, if not the largest, families in the Vespoidea, and is well represented in all parts of the world by many genera and species.

The species superficially resemble the Vespidæ, but are quite distinct and are easily distinguished by the cleft or toothed claws, the claws never being simple or edentate as in the social wasps.

The family, like the Vespidæ, has reached its greatest development in warm or tropical countries.

Our knowledge of this family, as well as of the *Vespidæ* and *Masaridæ*, is due mainly to the labors of the distinguished Swiss entomologist, Henry de Saussure, who has for more than half a century devoted most of his time to elucidating the groups, genera and species. He has done more work on these families than any other man, living or dead, and all of his papers should be in the hands of those who contemplate studying these wasps.

His greatest work, "Etudes sur les Vespides," in 3 Vols., 8 vo., with plates, was published during the years 1852 to 1856, and treats of the *Eumenidæ*, *Vespidæ* and *Masaridæ*.

These "Etudes" are typical of the best kind of systematic work, and should afford a model for us all to strive to imitate.

All wasps belonging to the family *Eumenidæ* are predaceous principally upon Lepidopterous larvæ, but a few attack also the larvæ of saw-flies belonging to the superfamily Tenthredinoidea. Although most of these wasps prey upon Lepidopterous larvæ as do the social wasps, yet in their habits they are quite different. The social wasps chew up or macerate their food before feeding to their young, which they carefully

watch and constantly feed during all stages of larval development. The potter wasps, on the contrary, act quite differently.

A potter wasp will go off, catch a caterpillar, sting it into insensibility, and then carry it off to its mud cell. This operation is repeated again and again, or until eight or a dozen or more caterpillars have been captured and stored away in its cell. An egg is then deposited on this fresh food, the cell is hermetically closed, and the mother wasp has finished her labours once and for all, and she cares no more for her still unborn offspring.

The young larva of a potter wasp receives no attention from its mother; on hatching, it finds sufficient fresh food at hand in the semi-paralyzed caterpillars stored up in the cell, and is able to care for itself.

I have recognized in the *Eumenidæ* four distinct subfamilies:

Table of Subfamilies.

1. Middle tibiæ with *two* apical spurs.....2.
   Middle tibiæ with *one* apical spur.....3.
2. Second cubital cell receiving both recurrent nervures.
   Second cubital cell oblong or quadrate, not or only slightly narrowed above; claws with a tooth near the middle.....Subfamily I.—Ischnogasterinæ.
   Second cubital never oblong or quadrate, always *much* narrowed above; claws cleft.....Subfamily II.—Discoelinæ.
   Second and third cubital cells each receiving a recurrent nervure.....Subfamily III.—Raphiglossinæ.
3. Second cubital cell receiving both recurrent nervures.....Subfamily IV.—Eumeninæ.

SUBFAMILY I.—Ischnogasterinæ.

The two spurred middle tibiæ separate this subfamily from the *Eumenidæ*; the second cubital cell receiving *both* recurrent nervures, separates it from the *Raphiglossinæ*, which have the second and third cubital cells each receiving a recurrent nervure; while from the *Discoelinæ*, to which it is closely allied, it is separated by the shape of the second cubital cell, which is oblong or quadrate, and by the claws, which have a tooth at or near the middle, beneath.

Table of Genera.

Clypeus elongate, rounded or triangular anteriorly, but *not* dentate; mandibles long.....Ischnogaster, Guérin.
(Type I. fulgidipennis, Guér.)

Clypeus subemarginate or bidentate anteriorly; mandibles oblong, narrowed, dentate.....Ischnogasteroides, Magretti.
(Type I. flavus, Magr.)

SUBFAMILY II.—Discoelinæ.

This group was first separated by Thomson, who called it a tribe. It is readily recognized by the cleft claws and by the shape of the second cubital cell.

Table of Genera.

1. Labial palpi three-jointed.....2.
   Labial palpi four-jointed.....6.
2. Petiole of abdomen swollen at the middle, and more or less contracted at both ends; antennæ inserted just above the clypeus.....3.
   Petiole of abdomen elongate, contracted or slender only at the base; antennæ inserted on the middle of the face.....5.
3. Second abdominal segment not contracted into a distinct petiole at base.....4.
   Second abdominal segment contracted into a distinct petiole at base; expansion of the petiole globularly lengthened..Didymogastra, Perty.
   (Type D. fusca, Perty.)
4. Second abdominal segment subsessile or very briefly petiolate.....Zethusculus, Saussure.
   (Type Zethus Jurinei, Sauss.)
   Second abdominal segment sessile or subsessile, enlarged gradually; clypeus transverse, lozenge-shaped, forming a sharp lateral angle on each side.....Heros, Saussure.
   (Type Zethus gigas, Spinola.)
5. Mandibles short, obliquely truncate.....Calligaster, Saussure.
   (Type C. cyanopterus, Sauss.)
6. Petiole neither short, polished, nor campanulate.....7.
   Petiole short, polished, campanulate.....9.
7. Mandibles short, stout.....8.
   Mandibles rather long, obliquely truncate and 4-dentate.....Discoelius, Latreiile.
   (Type Vespa zonalis, Panz.)

8. Petiole elongate, linear; mandibles obliquely truncate; clypeus wider than long.....Elimus, Saussure.
(Type E. australis, Sauss.)

Petiole elongate, but not linear, either clavate or subclavate, narrowed towards base; second cubital cell angulate above...Labus, Saussure.
(Type L. Humbertianus, Sauss.)

9. Clypeus transverse ovate, much wider than long, the anterior margin medially bidentate.....Stroudia, Gribodo.
(Type S. armata, Gribodo.)

SUBFAMILY III.—Raphiglossinæ.

In this subfamily the middle tibiæ have two apical spurs as in the two previously-defined subfamilies, but from these it is at once separated by the venation of the front wings, the second and the third cubital cells each receiving a recurrent nervure. In the other subfamilies the second cubital cell receives both recurrent nervures.

Table of Genera.

1. Mandibles short, 4-dentate; labial palpi 3-jointed, the joints long.....2.

Mandibles long, somewhat pointed and not distinctly dentate; labial palpi 4-jointed.....3.

2. Abdomen subsessile, the first segment not long; labium not especially long; maxillary palpi 6-jointed.....Stenoglossa, Saussure.
(Type Raphiglossa odyneroides, Saussure.)

Abdomen petiolate, the first segment long; labium very long; maxillary palpi 5-jointed.....Raphiglossa, Saunders.
(Type R. eumenoides, Saund.)

3. Abdomen petiolate; labium short; maxillary palpi 6-jointed, the joints short.....Gayella, Spinola.
(Type G. eumenoides, Spinola.)

SUBFAMILY IV.—Eumeninæ.

To this subfamily belong all Eumenids having the middle tibiæ with a single apical spur. The second cubital cell receives both recurrent nervures.

It is the largest and most extensive group in the family, and many genera and species are known.

I have divided it into three minor groups or tribes, which may be recognized by the characters employed in the following table:

Table of Tribes.

Second cubital cell not petiolate, although often narrowed or angulate above; mandibles most frequently long, acute, and when united forming a long beak, the teeth lateral.

Abdomen distinctly petiolate.....Tribe I.—Eumenini.

Abdomen sessile or subsessile, never distinctly petiolate.....Tribe II.—Odynerini.

Second cubital cell distinctly petiolate.....Tribe III.—Alastorini.

TRIBE I.—Eumenini.

This tribe is separated from the *Alastorini* by the non-petiolate second cubital cell, and from the *Odynerini* by the distinctly petiolate abdomen, the species being, as a rule, narrower, more elongate, and less robust.

Table of Genera.

1. Maxillary palpi 3-jointed; antennæ inserted on the middle of the face.....2.

   Maxillary palpi 6 jointed.....3.

2. Mandibles rather long and narrow, with blunt teeth on the inner margin; anterior angles of pronotum not acute.....Montezumia, Saussure.
   (Type M. rufidentata, Sauss.)

3. Labial palpi 4-jointed; second abdominal segment not constricted into a petiole at base, or, at the most, subpetiolate; clypeus longer than wide.....4.

   Labial palpi 3-jointed; second abdominal segment constricted into a petiole at base; head large, quadrate, the clypeus wider than long.....Zethus Fabricius.
   (Type Vespa coeruleopennis, Fabr.)

4. Mandibles at apex 3- or 4-dentate.....5.

   Mandibles at apex *bidentate*.....6.

5. Mandibles long, 4-dentate, the teeth, however, usually indistinct; clypeus at apex usually truncate; petiole long; third cubital cell irregular.....Eumenes, Fabricius.
   (Type Vespa coarctata, Linné.)

   Mandibles 3-dentate, the teeth acute; clypeus at apex bidentate; petiole long, subclavate, a little longer than the thorax; third

cubital cell quadrate or nearly; front angles of pronotum acute. (Liberia, Africa)..... Micreumenes, Ashmead, g. nov.
(Type M. Curriei, Ashm. MS.)

6. Petiole of abdomen rather short; wings very large..... Pachymenes, Saussure.
(Type P. sericea, Sauss.)

TRIBE II.—ODYNERINI.

Into this tribe fall the vast majority of the known genera and species belonging to the subfamily *Eumeninæ*. They are easily recognized by the sessile, or, at most, subsessile abdomen, and by their shorter, stouter, more robust form.

Table of Genera.

1. Abdomen with the first segment quite differently formed, neither distinctly funnel-shaped nor subcampanulate, often truncate at base..... 2.

Abdomen with the first segment funnel shaped or subcampanulate, subbidentate medially; maxillary palpi 6-, labial palpi 4-jointed..... Nortonia, Saussure.
(Type Odynerus intermedius, Sauss.)

2. First abdominal segment above, near the base, *without* a transverse carina..... 3.

First abdominal segment above, near the base, *bounded* by a transverse carina..... 11.

3. Maxillary palpi 5-jointed or less..... 12.
Maxillary palpi 6-jointed..... 4.

4. Labial palpi 3-jointed..... 5.
Labial palpi 4-jointed..... 7.

5. Labial palpi neither very long nor plumose..... 6.
Labial palpi very long, plumose; mandibles distinctly 4- or 5-dentate..... Pterocheilus, Klug.
(Type P. Pallasii, Klug.)

6. First joint of maxillary palpi very large, much swollen, almost as long as the following joints united; last joint of the labial palpi very small; ♂ antennæ simple..... Abisba, Mitchell.
(= Monerebia, Sauss.)
(Type Vespa ephippium, Fabr.)

First joint of maxillary palpi not much swollen and much shorter than the following joints united; last joint of the labial palpi not especially small; ♂ antennæ enrolled at apex..Micragris, Saussure.
(Type M. spinotæ, Sauss.)

7. Clypeus *not* transverse, as long or longer than wide.....8.
Clypeus transverse, wider than long; labial palpi and paraglossæ very slender.....Leptochilus, Saussure.
(Type Pterochilus mauritianus, Lepel.)

8. Last three joints of maxillary palpi normal, not very small; labial palpi and paraglossæ not especially slender.....9.
Last three joints of maxillary palpi very small..Rhynchium, Spinola.
(Type Vespa oculata, Fabr.)

9. Mesonotum *without* distinct parapsidal furrows, either wanting or only vaguely defined basally; ♂ antennæ at apex ending in a hook or spirally contorted.....10.
Mesonotum *with* usually distinct parapsidal furrows; ♂ antennæ at apex simple.....Odynerus, Latreille.
(Type Vespa murarius, Latr.)

10. Thorax coriaceous or closely finely punctate; clypeus at apex usually semicircularly emarginate, bidentate; antennæ widely separated at base, in ♂ at apex depressed and spirally contorted; mandibles 2- to 3-dentate..... Hoplomerus, Westwood.
(Type Vespa spinipes, L.)
Thorax punctate, not coriaceous; clypeus at apex truncate or subemarginate; antennæ not widely separated at base, in ♂ ending in a hook; first abdominal segment dorsally at apex with a short median groove; second ventral segment produced and truncate at base; mandibles 4-dentate.....Leionotus, Saussure.
(Type Odynerus humeralis, Hal.)

11. First abdominal segment truncate at base, not divided by a longitudinal groove or furrow; antennæ in ♂ ending in a hook.
Maxillary palpi 6-jointed.....Ancistrocerus, Westwood.
(Type Vespa parietum, Linné.)
Maxillary palpi 5-jointed.....Monobiella, Ashmead, gen. nov.
(Type Vespa atrata, Fabr.)
First abdominal segment somewhat funnel-shaped, and divided above by a deep longitudinal groove; antennæ in ♂ simple..... Symmorphus, Wesmael.
(Type Vespa sinuata, Fabr.)

12. Maxillary palpi 3- or 4-jointed.....13.
Maxillary palpi 5-jointed.
Labial palpi 3-jointed.....Monobia, Saussure.
(Type Vespa quadridens, L.)
Labial palpi 4-jointed.....Hypagris, Saussure.
(Type H. abdominalis, Sauss.)

13. Maxillary palpi 4-jointed.....14.
Maxillary palpi 3-jointed.....15.

14. Metathorax quadridentate.....Antagris, Saussure.
(Type A. aequatorialis, Sauss.)
Metathorax concave, bidentate or bispinose.....Paragris, Saussure.
(Type P. Humbertii, Sauss.)

15. Metathorax short, impressed or subconcave posteriorly, the post-scutellum often broadly but not deeply emarginate or impressed at apex; mesonotum without distinct furrows, at the most represented by two delicately impressed abbreviated lines posteriorly; mandibles long, acute.....Synagris, Latreille.
(Type Vespa cornuta, L.)

TRIBE III.—Alastorini.

This tribe is separated from the two previously-defined tribes by the venation of the front wings, the second cubital cell being distinctly petiolate.

Table of Genera.

1. Abdomen sessile or subsessile.....2.
Abdomen distinctly petiolate.....3.

2. Mandibles long, acute, bluntly dentate within; maxillary palpi 6-jointed; labial palpi long, 4-jointed, the last joint minute.
First abdominal segment *without* a transverse suture or furrow.....Alastor, Lepeletier.
(Type A. atropos, Lepel.)
First abdominal segment *with* a transverse suture or furrow.....Alastoroides, Saussure.
(Type Alastor clotho, Lepel.)

3. Form slender; thorax elongate.....Smithia, Saussure.
(Type S. Natalensis, Sauss.)