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

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(Paper No. 13.-Continued from Vol. XXXV., p. 44.)

FAMILY XL.-Thynnidæ.

This family, although quite distinct, is closely allied to the two which follow—the *Myrmosidæ* and the *Mutillidæ*—and it will probably be difficult for the student to separate at once the wingless females from some in the families mentioned. Some authorities, having been unable to find good characters to separate these wasps, have classified all together as a single large family under the name *Mutillidæ*; but I think incorrectly so.

The middle coxæ are not contiguous, as in the Mutillidæ and Myrmosidæ, being separated, usually, by a triangular or bilobed projection of the mesosternum, while the thorax in the females is also quite distinct, being divided into three parts; in the Myrmosidæ the thorax is divided into two parts only, while in the Mutillidæ it is undivided, the pro-, mesoand meta-thorax being closely united, without distinct dividing sutures.

The males in the three families, to a certain extent, closely resemble one another, and are not so easily separated, although each family has a distinct *habitus* peculiarly its own, which one easily recognizes with practice, the shape of the head, the thorax and the abdomen being slightly different; the genitalia armature, however, with but few exceptions, is quite different in the three families.

Many genera have been proposed for these wasps, the majority of which I consider good, although Dr. von Dalla Torre, in his Catalogus Hymenopterorum, has placed most of them under the genus *Thynnus*, Fabr., causing much confusion. This arrangement throws a great many with the same specific name together, and for these he has proposed new specific names, which still further complicates matters, burdens our literature with names that will not hold, but which must be quoted, and making it exceedingly difficult to keep track of.

I find the date of Guérin's Paper on this group, published in Duprerry's Voyage de la Coquille, is given as 1830, whereas, although the title page is so dated, it did not appear until 1839; it also makes certain changes in synonymy necessary. The family is very large and widely distributed, but is more extensively represented in South America, in Australia and Africa than elsewhere, Europe and North America having only a few representatives.

The study of the genera and species is most difficult on account of the great dissimilarity of the sexes, the slowness with which material comes in, and the absence of good collectors to take the sexes *in coitu*, so that the sexes can be correctly correlated and the genera more thoroughly elaborated.

I have divided the family into three subfamilies, which may be recognized by the characters employed in the following table:

Table of Subfamilies.

Females
Males
1. Body rather short, not elongate: thorax above convex, the metathorax
very short, obliquely truncate posteriorly, transversely compressed or
sublamellar, more rarely long
Body elongate and slender; thorax above more or less flattened, rarely
convex.
Metathorax never very short, nor transversely compressed;
abdomen smooth, the second dorsal segment without transverse
folds or carinæ, the pygidium and hypopygium normal2.
Metathorax very short, obliquely truncate posteriorly, from the
base or very near the base, transversely compressed or sub-
lamellar; abdomen not smooth, variously sculptured, the second
dorsal segment more or less punctured, or rugulose, and usually
with two or more transverse folds or carinæ, sometimes many ;
pygidium and hypopygium abnormal, variously
modifiedSubfamily I., Thynninæ.
2. Head transverse, much wider than long, the eyes large, the ocelli
distinct

- 3. Metathorax short, usually obliquely truncate from its base; abdomen not wholly smooth, the second dorsal segment punctate or rugulose, and usually with two or more transverse folds or carinæ, the pygidium and hypopygium abnormal, variously modified, the latter usually

	dilated into a broad margin at apex, or trumpet-shaped, the former
	often striate or coarsely sculptured Subfamily I., Thynninæ.
	Metathorax not very short; abdomen smooth, the second dorsal
	segment without transverse folds or carinæ, the pygidium and hypo-
	pygium normal, not modified in any
	way Rhagigasterinæ.
4.	Hypopygium armed with one or more spines or teeth or trilobed5.
	Hypopygium unarmed, at apex truncate or rounded9.
5.	Thorax elongate; front wings with radial and cubital cells
	Thorax rounded; front wings without radial and cubital cells 9.
6.	First transverse cubitus distinct, with an appendage
	First transverse cubitus wanting, or if present, without an appendage 8.
$7 \cdot$	Mandibles bidentate Subfamily I., Thynninæ.
	Mandibles tridentate Subfamily III., Rhagigasterinæ.
8.	Hypopygium produced at apex into a long aculeus which curves
	upwardsSubfamily II., Methocinæ.
	Hypopygium armed with a long aculeus which curves upwards, but
	that originates before the apex Subfamily III., Rhagigasterinæ.
9.	Mandibles bidendate Subfamily I., Thynninæ.
	Mandibles tridentate
9.	Mandibles bidendate Subfamily I., Thynnina

Subfamily I.-Thynninæ.

The males in this group show a wonderful difference in the structure of the mouth-parts and in their genitalia, which, in time, will enable the group to be divided into four or more tribes, namely, *Thynnini*, *Myrmecodini*, *Scotaenini*, *Amblysomini*, etc.; but this had better not be done until more of the forms, in both sexes, are known.

Table of Genera.

1.1

Ma	les
Fen	nales
	Hypopygium armed, ending in a single triangular tooth or spine, or
	tridentate or trilobed ; sometimes 5-dentate, a small tooth on each
	side at base in addition to the apical teeth; sometimes oblong,
	narrowed, tridentate, or trilobed at apex
	Hypopygium unarmed, truncate or rounded at apex
2.	Hypopygium at least tridentate or trilobed, sometimes 5-dentate3.
	Hypopygium ending in a large triangular tooth or single spine, rarely
	with indications of a lobe at the basal angles of same, the lateral
	margins sometimes arcuate or rounded

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3.	Hypopygium 3-dentate, or trilobed6.
	Hypopygium 5-dentate, or with 5 spines.
	Clypeus produced and anteriorly truncate or subarcuate, with a
	short, stout tooth or elevation at the basal lateral angles, near
	the base of the eyes
	Clypeus anteriorly not much produced, rounded, without a tooth
	at the basal lateral angles
4.	Abdomen fusiform or ovate, not longer than the head and thorax united, the segments constricted at the sutures ; segments $2-3$, or
	more, with yellow or yellowish-white spots; first ventral segment
	with a triangular tooth or elevation near the middle, the sixth with
	a tooth at the apical angle; maxillary palpi 6-jointed; labial palpi
	4-jointed. (Australia)
	(Type T. dentatus, Fabr.)
	Abdomen longer than the head and thorax united, the sides nearly
	parallel, the segments more or less constricted at the sutures, black,
	immaculate, the first and sixth ventral segments normal, unarmed;
	maxillary palpi 6-jointed, the joints short; labial palpi 4-jointed.
	(Australia.)
	(Type Thynnus fumipennis, Westw.)
5.	Metathorax with a median tooth at apex; abdomen longer than the
	head and thorax united, cylindrical, the sides parallel, the segments constricted at apex, immaculate; maxillary and labial palpi both
	4-jointed. (Australia)Iswaroides, Ashmead.
	(Type I. Koebelei, Ashm.)
6.	Marginal cell at apex pointed or slightly rounded, but never truncate;
	second cubital cell not triangular
	Marginal cell at apex truncate ; second cubital cell triangular.
	Clypeus with a median emargination anteriorly; maxillary and
	labial palpi both 3-jointed. (India) Iswara, Westwood.
	(Type I. luteus, Westw.)
7.	Hypopygium not narrow, in outline triangular, 3-dentate, the middle
	tooth large, triangular, projecting far beyond the lateral teeth, which
	are usually small
	Hypopygium quite differently shaped, narrower and oblong, as wide or nearly at apex as at base, the sides parallel or nearly, the apex
	usually briefly tridentate or trilobed, the teeth or lobes equal or
	nearly, the middle tooth very rarely much longer than the lateral
	teeth

- - usually large and distinctly visible, rarely partly concealed. Head with a prominence above the insertion of the antennæ and connected with the clypeus by a carina; antennæ of moderate length; fifth ventral segment *with* a tooth at each apical angle; pygidium subtriangular, broader at base than long, and longitudinally striated; maxillary palpi 6-jointed; labial palpi 4-jointed. (Australia).....Zaspilothynnus, Ashm., gen. nov. (Type Thynnus Leachiellus, Westw.)
 - Head anteriorly with two prominences, beneath which are inserted the antennæ; antennæ very long; fifth ventral segment *without* a tooth at the apical angles.

9. Clypeus trapezoidal, truncate anteriorly.

Maxillary palpi 6-jointed, the middle joints the longest; labial palpi 4-jointed, the first joint the shortest, *without* a tuft of hairs at apex, joints 2-4 longer, nearly equal in

length. (Australia) Thynnoides, Guérin. (Type T. fulvipes, Guér.)

Maxillary palpi 6-jointed, the three last joints very long, much longer and slenderer than the basal joints; labial palpi 4-jointed, the first very long, nearly as long as joints 2-4 united, with a tuft of very long hairs at

apex. (Australia)..... Pseudaelurus, Ashm., gen. nov. (Type Aelurus abdominalis, Guérin.)

Pygidium at apex rounded, but *with* a median incision or emargination. Abdomen fusiform, maculate; hypopygium with the sides strongly rounded or arcuate, and ending in a rather long spine, which is more than three times as long as thick at base; maxillary palpi 6-jointed; labial palpi 4-jointed.

(Australia) Catocheilus, Guérin. (Type C. Klugii, Guér.)

(Type Tiphia pedestris, Fabr.)

Labrum bilobed; hypopygium ending in a spine which curves slightly upwards, the lateral margine almost straight.

Maxillary palpi 6-jointed, the last joint longer than the penultimate; labial palpi 4-jointed.

(Australia) Guérinius, Ashm., gen. nov. (Type Thynnus flavilabris, Guér.)

13. First ventral segment *unarmed*.....14. First ventral segment *armed* with a prominent median tooth.

Head more than twice as wide as thick antero-posteriorly; abdomen maculate; maxillary palpi

6-jointed Agriomyia, Guérin.

(Type A. maculata, Guérin.)

(Type Thynnus odyneroides, Westw.)

Abdomen fusiform, longer than the head and thorax united, the hypopygium triangularly pointed, the sides only slightly arcuate;

	maxillary palpi 6-jointed, the second and the last joint longer than
	joints 3-5; labial palpi 4-jointed,
	short Hemithynnus, Ashm., gen. nov. (Type Thynnus hyalinatus, Westw.)
15.	Maxillary palpi 6-jointed, long, the joints, except the first, which is
	very short, long, subequal, the last joint the slenderest and a little the longest; labial palpi 5-jointed. (South
	America)
	(Type Myrmecodes dimidiatus, Hal.
16.	Hypopygium ending in three small, equal or nearly equal, triangular
	teeth, rarely with the middle tooth much longer than the lateral, or
	spined
	Hypopygium ending in three small, equal, rounded lobes19.
17.	Clypeus subproduced and anteriorly emarginate, excised or bidentate
	Clypeus produced, trapezoidal, the anterior margin truncate, never
	emarginate or excised.
	Abdomen elongate, subcylindrical, smooth, shining, spotted with
	yellow, much longer than the head and thorax united; first
	joint of flagellum only about half the length of the second ; hypopygium at apex 3-spined, the middle spine the
	longest. (Australia) Aeolothynnus, Ashm., gen. nov.
	(Type A. multiguttatus, Ashm.)
18.	Abdomen oblong-oval or fusiform, longer than the head and thorax united, the segments banded or maculate with white or
	yellow. (South America) Pseudelaphroptera, Ashm., gen. nov.
	(Type Elaphroptera Spinolæ, Sauss.)
19.	Clypeus broadly, semicircularly emarginate anteriorly, leaving a deep
	concave space; metathorax with two deep impressions or short
	furrows at apex; maxillary palpi long, 5-jointed, the first joint short; maxillary palpi 4-jointed; abdomen elongate, narrowed
	towards base, shining, but microscopically shagreened.
	(South America)
	. (Type Elaphroptera atra, Guér.
20.	Third cubital cell, along the cubitus, shorter than the second or no
	longer
	Third cubital cell distinctly longer than the second

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21.	Clypeus subproduced, with a slight median sinus or incision anteriorly, the labrum well developed ; maxillary palpi 5-jointed ; labial palpi 4-jointed. (Australia) Anthobosca, Guérin. (Type A. Australasiæ, Guér.
22.	Mandibles narrower, curved, the teeth acute ; abdomen oblong, fusi- form or subcylindrical, as long or longer than the head and thorax united
	Mandibles broad, the apical tooth large, obtuse, the inner tooth with a long cutting face ; abdomen oval, hardly as long as the thorax or no longer.
	Head about twice as wide as thick antero-posteriorly, not wider than the thorax; pronotum short, transverse; mesonotum fully as wide as long, with two furrows; metathorax short, rounded behind
23.	First transverse cubitus with an appendage 24.
	First transverse cubitus without an appendage.
	Abdomen long, cylindrical, the first segment much longer than wide at apex, petioliform. (South
	America)
24.	Clypeus produced and anteriorly broadly truncate, trapezoidal25. Clypeus anteriorly not broadly truncate, slightly rounded, subemar- ginate, deeply triangularly emarginate, or bidentate
25.	Clypeus with a median carina; maxillary palpi 6-jointed, slender; labial palpi 4-jointed; abdomen maculate or fasciate with yellow. (Australia)Zeleboria, Saussure. (Type Thynnus carinatus, Smith.)
	Clypeus <i>without</i> a median carina; maxillary palpi 6-jointed, not slender; labial palpi 4-jointed; abdomen with white spots, the hypopygium near the tip with a pointed and a clavate appendage of hairs
26.	Hypopygium not prominently projecting, always obtuse or truncate at
	apex
	prominently projecting beyond the tip of the abdomen.

Clypeus anteriorly rounded, not emarginate.

Abdomen fusiform, a little longer than the head and thorax united, maculate or fasciate; maxillary palpi 6-jointed, the last three joints much longer than the first three, or twice as long; labial palpi 4-jointed, joints 1 and 4 longer and slenderer than 2 and 3, which are short, stout. (South America.....Anodontyra, Westwood.)

(Type A. tricolor, Westw.)

- 28. Clypeus anteriorly subemarginate; maxillary palpi 6-jointed, joints 1-3 rather short, joints 4-6 long, subequal, five or six times longer than thick; labial palpi 4-jointed, the first joint long and slender, about as long as 2-4 united; abdomen fasciate. (South America.)
 - Clypeus anteriorly bidentate; maxillary palpi 6-jointed, the joints obconical, unequal, the first four short, the third and fourth much longer than the second. (South America).....Ornepetes, Guérin. (Type O. nigriceps, Guér.)

29. Pygidium not very narrow, oblong, rounded at apex, usually shagreened, punctate, rugulose or striate; if smooth, which is rare, it is curiously modified, compressed towards base and broadened into an elevation posteriorly; basal segment of abdomen *without* a strongly curved furrow on each side or a strong transverse furrow before the apex. 30. Pygidium very narrow, smooth and shining; basal abdominal segment *with* a strongly curved furrow on each side, or a deep, transverse furrow before apex.

Basal abdominal segment with a strongly curved furrow on each side; second segment with about three transverse folds or carinæ; pygidium with two pencils of long golden hairs that curve and meet above the narrow elevation on

its disk..... Thynnus, Fabricius. Basal abdominal segment with a strong transverse furrow just before apex; second segment with three transverse folds or

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	carinæ ; pygidium long, lanceolate, broadest at apex, without
	the two pencils of golden hairs
30.	Head seen from above not triangular, usually transverse, subquadrate
	or obtrapezoidal
	Head seen from above triangular.
	Eyes small, oval, extending to base of mandibles ; clypeus very
	short, truncate; mandibles falcate, pointed at apex; maxillary
	palpi 4-jointed; labial palpi 3-jointed; second segment of
	abdomen with two transverse folds or carinæ towards
	apexIswaroides, Ashmead.
31.	Pronotum not quadrate, obtrapezoidal, or wider in front than behind33.
	Pronotum quadrate, usually, however, a little wider than long, but not
	wider in front than behind.
	Head not or scarcely wider than the thorax, the latter not
	Head much wider than the thorax, the latter being very narrow,
	with the sides parallel; dorsal abdominal segments 1 and 2
	strongly transversely furrowed; pygidium oval or nearly and
	longitudinally striateCatocheilus, Guérin.
32.	Clypeus slightly produced, truncate anteriorly, the labrum visible as
	a narrow transverse line, ciliate; mandibles narrow, acute at apex;
	maxilary palpi 6-jointed, not short ; labial palpi 4-jointed.
	(Australia) Entelus, Westwood.
	(Type E. bicolor, Westw.)
	Clypeus short, broadly truncate anteriorly, but the labrum not visible ;
	mandibles falcate, rounded at apex; maxillary and labial palpi both
	4-jointed; first abdominal segment with a broad, finely shagreened
	depression at apex, the second segment with two transverse carinæ, the intermedian space between the carinæ shagreened, opaque;
	pygidium narrowly compressed towards apex and then abruptly
	dilated or trumpet-shaped
33.	Head large, obtrapezoidal, subquadrate or subglobose, the temples or
55	the space back of the eyes very broad, without furrows or impres-
	sions extending from the antennæ to the vertex
	Head transverse, much wider than thick antero-posteriorly, the
	temples not especially broad, with sometimes two furrows or
	impressions extending from antennæ to vertex

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- about twice the width of the eye.
- - Metathorax with the disk of the oblique truncation concave or subconcave.

Abdomen large, oblong-oval, the second dorsal segment coarsely rugulose, with two transverse folds or carinæ at apex; pygidium longitudinally rugulose Elaphroptera, Guérin.

- - Metathorax with a hump-like elevation at base just behind the scutellum.
 - Second abdominal segment with a transverse fold or carina near base and another near apex, the intermediate space very coarsely rugulose; pygidium oblong-oval, finely, longitudinally aciculated towards apex Pycnothynnus, Ashm.

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	from the middle which is rugulose ; pygidium oblong-oval, rugulose
	towards base; mandibles with a sinus before apex, appearing
	bidentate Westwood.
30.	Clypeus without a trace of a median carina, the anterior margin
59	truncate
	Clypeus with a more or less distinct median carina, the anterior
	margin subangularly produced.
	Pygidium oblong-oval, longitudinally striate, and with a lobe or
	tooth on each side before the apex; first abdominal segment
	with traces of transverse carina or elevated lines at apex, the
	second segment with many transverse folds or carinæ, 17 or
	more; metathorax sloping from its
	base
10	Pygidium oblong, with a more or less elongate, lanceolate elevation
40.	on its disk gradually broadened posteriorly, the elevation with
	some longitudinal lines towards base, smooth at apex; first
	abdominal segment with a depression at apex, the second segment
	with five transverse folds or carinæ, metathorax sloping from a little
	beyond its base, leaving a short but distinct
	metanotum
11.	Pygidium very narrow, or strongly compressed towards base, with an
T	elevation towards apex
	Pygidium neither very narrow nor compressed towards base, without
	an elevation or disk, above flat or subconvex, striate, punctate or
	rugulose
12	Head about twice as wide as thick antero-posteriorly, or three times as
+ • •	wide as thick when viewed from above.
	Second dorsal abdominal segment with three or more transverse
	folds or carinæ
	Second dorsal segment with only one transverse carina just before
	apex, the anteriorly portion rudely
	punctate
43.	Second abdominal segment with many transverse folds or carinæ 44.
	Second abdominal segment with three transverse folds or carinæ.
	Pygidium elongate, smooth, the hypopygium with two converging
	carinæ at base
	(Type Thynnus carinatus, Smith.)
44.	Second abdominal segment with 20 or more transverse carinæ, the
	first segment with a transverse furrow just before apex, the third and

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following segments smooth; head with a concave depression above each antenna that extends to the vertex; pygidium strongly compressed at the middle, and then broadened into an oval plate, the basal portion, which is separated from the oval apical portion by the strongly compressed portion, is transversely striated, while the apical portion is smooth......Zaspilothynnus, Ashm.

Second abdominal segment with about 13 or 14 transverse carinæ, the first segment with many oblique striæ at the sides towards apex, the following segments after the second shining but microscopically shagreened, with a few scattered feeble punctures, especially noticeable on apex of the two last segments; pygidium compressed basally, dilated apically, but with an emargination on each side at apex, smooth and *without* transverse striæ at

- - Pygidium not very narrow, deflexed apically, longitudinally striated, and with a tooth or lobe at each side towards the base ; mandibles broad and flat, obtuse at apex, with a longitudinal grooved line along the inner margin and another along the outer margin for a little more than half

46. Head *without* convex impressions extending from the antennæ to vertex, subopaque; clypeus transversely narrowed, with a slight median tooth anteriorly; mandibles long, falcate; second dorsal abdominal segment with a transverse carina near base and another near apex, the intermediate space multistriated transversely; pygidium oblongoval, longitudinaily striated with a notch on each side before apex; maxillary palpi 3-jointed; labial palpi

4-jointed Hemithynnus, Ashmead.



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Ashmead, William H. 1903. "CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA." *The Canadian entomologist* 35, 95–107. <u>https://doi.org/10.4039/ent3595-4</u>.

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