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WHAT IS A GENUS?*

BY HENRY H. LYMAN, MONTREAL.

This question is one that it is extremely difficult to answer satisfactorily.

The great naturalist, Agassiz, in his Essay on Classification, wrote : "Genera are most closely allied groups of animals differing * * * simply in the ultimate structural peculiarities of some of their parts."

The Century Dictionary defines genus as "a classificatory group ranking next above the species, containing a group of species (sometimes a single species) possessing certain structural characters different from those of any others." It goes on, however, to say : "The value assigned to a genus is wholly arbitrary—that is, it is entirely a matter of opinion or current usage what characters shall be considered generic and thus constitute a genus ; and genera are constantly modified and shifted by specialists, the tendency being mostly to restriction of genera, with the constant multiplication of their numbers, and the coinage of new generic names. A genus has no natural, much less necessary, definition, its meaning being at best a matter of expert opinion ; and the same is true of the species, family, order, class, etc."

It will doubtless be readily granted, however much we may differ as to generic values, that at least all the individuals of the same species should belong to the same genus, but this, unfortunately, is not always the case, as some species vary sufficiently in structure to run into two or more genera, as these are frequently defined.

Having had the good or bad fortune to find about the middle of August, 1898, a mature larva closely resembling that of *E. Oregonensis*, though differing in colour, from which I bred on 1st of April, 1899, a moth so closely resembling *E. Egle*[†] that probably 99 men out of a 100

*Read before the Montreal Branch, 13th May, 1902.

†The question whether the generic name *Euchaetes*, proposed by Harris, or *Euchaetias*, proposed by me, should be used for the genus of which this moth is the type, I am willing to leave to the principal authorities on such matters to decide, but wish to say what I perhaps did not make sufficiently clear in my note on page 52 (correcting my error in regard to the name I proposed for a genus in the Coleoptera), that in giving Mr. Henshaw's views upon the subject, as conveyed to me by letter, I did not mean it to be inferred that I accepted or concurred in them.

would pronounce it to be that species, I naturally became very much interested.

I carried the moth with me to Washington, where it was carefully examined by Dr. Dyar, who pronounced that it belonged to the genus *Pygarcia*, as it had an accessory cell.

Before venturing to describe it, I determined to obtain as many of the species of the group as possible, and through the kindness of Mrs. Slosson was able to add a specimen of *Pygarcia Abdominalis* to my collection, and obtained by purchase several other species.

In Neumoegen and Dyar's "Preliminary Revision of the Bombyces of America north of Mexico," published in 1893-94*, all the moths for which the name *Euchætës* had been used were embraced in Hübner's genus *Cycnia*, which that author had also used for *Hyphantria Cunea*, but in September, 1897, Dr. Dyar published in the CANADIAN ENTOMOLOGIST "A Generic Revision of the Hipocritidæ (Arctiidæ)," in which the moths in question were divided into three genera, *Cycnia* characterized as having "veins 7 to 10 of primaries stalked," *Pygarcia* with "accessory cell present," and *Euchætës* "accessory cell absent," and in the list of genera and species these moths were distributed among these three genera as follows:

CYCNIA, Hübn.	<i>scepsiformis</i> , Graef.
<i>tenera</i> , Hübn.	<i>albicosta</i> , Walk.
<i>sciurus</i> , Boisd.	EUCHÆTES, Harris.
<i>insulata</i> , Walk.	<i>egle</i> , Dru.
PYGARCIA, Grote.	<i>eglenensis</i> , Clemens.
<i>abdominalis</i> , Grote.	<i>Oregonensis</i> , Stretch.
<i>vivida</i> , Grote.	<i>perlevis</i> , Grote.
<i>murina</i> , Stretch.	<i>Spaguei</i> , Grote.
<i>Bolteri</i> , H. Edw.	<i>zonalis</i> , Grote.
<i>elegans</i> , Stretch.	

When, however, I came to study the venation for myself, I got into difficulties at once, as I found that while *Tenera* had the veins 7-10 stalked as described, *Abdominalis* had no accessory cell, while *Egle* had it. I therefore immediately wrote to Dr. Dyar, who admitted that he had

* Journal N. Y. Ent. Soc., I.-II.

evidently made an accidental transposition when first looking up the characters, and kindly sent me the results of his examination of the species as represented in the National Museum, as follows:

CYCNIA

<i>tenera</i>	no cell
<i>sciurus</i>	no cell
<i>cadaverosa</i>	no cell

PYGARTIA.

<i>abdominalis</i>	no cell
<i>vivida</i>	(not in collection)
<i>murina</i>	cell
<i>elegans</i>	cell
<i>scepsiformis</i>	cell
<i>Bolteri</i>	cell

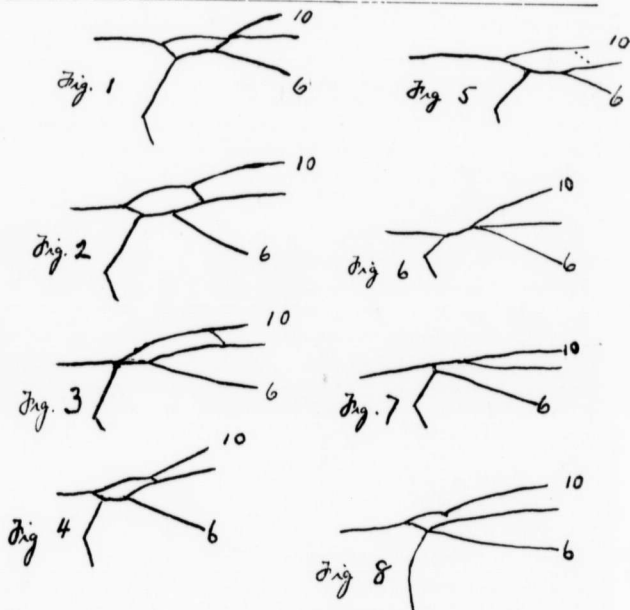
EUCHÆTES.

<i>egle</i>	cell
<i>eglenensis</i>	no cell
<i>pudens</i>	no cell
<i>Oregonensis</i>	no cell
<i>perlevis</i>	no cell
<i>Spraguei</i>	no cell
<i>zonalis</i>	(not in collection)

and suggested my transferring *Murina*, *Elegans*, *Scepsiformis* and *Bolteri* to Euchætes, and *Eglenensis*, *Pudens*, *Oregonensis*, *Perlevis* and *Spraguei* to Pygartia. But when I came to examine my series of *Egle*, and found such an extraordinary range of variation both as to the presence or absence of the cell, and also as to the venation, I came to doubt whether any of these characters were sufficiently constant as to be of generic value.

I found an occasional specimen lacking the accessory cell, and several with it present on one side and absent on the other, as well as great variation in the branching of the veins.

When I had the pleasure of a visit from Dr. Dyar, April 23rd-24th, 1901, prior to his trip to Colorado, I showed him my series of *Egle*, and from an examination under a microscope he kindly drew for me the sketches from which the accompanying illustrations of venation have been prepared.



NOTES ON ILLUSTRATIONS.

No. 5.—The wing on the other side has the cell present.

No. 6.—The wing on the other side has a small cell present.

The specimens represented in the other figures are approximately the same on both sides.

From these figures it will be seen how many genera could be founded upon a few of my specimens of this common and well-known species.

When a common species is found to vary greatly in this way, it is fair to infer that an examination of an equal number of each of the other species in the same genus would probably disclose as surprising variations, and it therefore becomes of the highest importance that in founding new genera every available specimen should be carefully examined to see whether the characters proposed to be used for differentiation are sufficiently constant to warrant the erection of a new genus upon them, and authors should invariably state the number of specimens which they have examined for this purpose. If this were done we should have fewer genera, but they would be more satisfactory.

Sir George Hampson deals with these species in the third volume of his work on the moths of the world as represented in the British Museum, but uses a different arrangement from either of those used or suggested by Dr. Dyar, dividing them among the three genera, Ammalo, Walk.; Pygarcia, Grote, and Euchætes, Harris, which he characterizes according to the following table :

GENERA AS USED AND DEFINED BY SIR GEORGE F. HAMPSON, BART.

Ammalo, Walk.	Pygarcia, Grote.	Euchætes, Harris.
Proboscis fully developed.	Proboscis aborted, minute.	Proboscis aborted, minute.
Palpi upturned, not reaching vertex of head, the third joint short.	Palpi porrect, extending to just beyond frons.	Palpi porrect to just beyond the frons.
Antennæ of male bipectinate, with rather long branches, of female with short branches.	Antennæ of male bipectinate, with the branches short.	Antennæ bipectinate, with moderate branches in male, with very short branches in female.
Tibiæ with spurs moderate.	Tibiæ with spurs short, fore tibiæ with curved apical claw.	Tibiæ with spurs moderate.
Abdomen dorsally clothed with rough hair at base.	Abdomen smoothly scaled.	
Fore wing with veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8, 9, 10 stalked; 11 free.	Fore wing with vein 3 from close to angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 from cell.	Fore wing with vein 3 from close to angle of cell; 4, 5 from angle; 6 from upper angle 7, 8, 9 stalked; 10, 11 from cell.
Hind wing with vein 3 from close to angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8 from beyond middle of cell.	Hind wing with veins 3, 4 from angle of cell; 5 from just above angle; 6, 7 from upper angle; 8 from towards end of cell.	Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 8 from beyond middle of cell.

Leaving out those species not found in America north of Mexico, the following is his arrangement :

AMMALO, Walk.

Insulata, Walk. (Halesidota), = *Pareuchætes Cadaverosa*, Grote.

Tenera, Hübn., = *Sciurus*, Boisd.

Eglenensis, Clem.

PYGARTIA, Grote.

Spraguei, Grote.

Vivida, Grote.

Abdominalis, Grote.

Elegans, Stretch.

EUCHÆTES, Harris.

Antica, Walk. (Halesidota), = *Zonalis*, Grote.

Albicosta, Walk. (Phragmatobia), = *Scepsiformis*, Graef.

Perlevis, Grote.

Murina, Stretch.

Bolteri, Stretch.

Egle, Drury.

Oregonensis, Stretch.

Pudens, H. Edw.

It should be noted that the genus Ammalo is not regarded as being at all closely related to Pygarcia or Euchætes, but rather very much separated from them. It is treated of on pp. 82-86, while Pygarcia is described on pp. 415-417, and Euchætes on pp. 417-420.

Whether a fuller examination of a larger series of these moths would not again upset their arrangement and necessitate a new classification, the future alone can tell, but I feel very strongly that far too much classificatory work is done on very insufficient material, and after too superficial a study of the material available.*

*In Ent. News, XIII., 192, reference is made to *Psychophora Fasciata*, Skinner, one specimen of which received by Dr. Dyar was found to agree with the *N. ciuidæ* in venation, while the next one received had the venation typical of the Geometridæ, thus showing the sometimes unsatisfactory nature of these characters.

A NEW COCCID FROM CALIFORNIA AT A VERY HIGH ALTITUDE.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Exæretopus caricis, n. sp.

Adult ♀ salmon pink, shiny, about 2 mm. long and 1 mm. broad, elongate oval. Legs and antennæ light brown. ♀ secretes a mass of cotton all over her body, becoming so dense as to completely envelope the entire body, looking more like an elongated *Eriococcus*. This secretion extends caudad, forming a large egg-sac, which, including the whole insect, measures from 4 to 5 mm. Eggs salmon pink. Young larvæ orange colour. Adult ♀ after boiling in K. O. H. derm remains light brown. Margin beset with fine, short, straight spines, incisions having two stout curved spines. There are numerous short conical spines scattered over the derm with irregular rows of long fine hairs. Anal plates large and thick, each with four short, stout spines. Anal ring with six very long, stout hairs, which extend to caudal end of plates. Antennæ long, slender, tapering, 8-jointed. Joint 3 always longest and joint 7 always shortest, each joint with one or more fine hairs, joint 8 with several long hairs. *Formula*: 3.4. 5. 8. (1.2.) 6. 7.

	1.	2.	3.	4.	5.	6.	7.	8.
Measurements of joints in μ :	40.	40.	100.	55.	60.	32.	28.	48.
	40.	40.	80.	60.	50.	30.	24.	24.
	40.	40.	80.	60.	48.	32.	22.	36.
	40.	41.	100.	64.	52.	30.	25.	40.

Legs long and slender. Coxa about half as long as tibia and quite stout. Tibia very little longer than femur. Front tarsus two-jointed. Tarsal digitules long, fine, knobbed hairs about 56μ , those of claw stout, curved clubs, about 32μ . Legs not very hairy, trochanter with a long slender hair. Claw sharply curved.

Hab.—On stems of *Trisetum subspicatum*, (L.) Beauv., and *Carex Breweri*, Boott. Mt. Shasta, above timber line, September 3rd, 1901.

Note.—I have placed this interesting species in *Exæretopus* owing to its two-jointed tarsus. The only other species known is *E. formiceticola*, Newst. (The Ent. Mo. Mag., Vol. V., p. 204), and differs very much from the above species. *E. caricis* abandons the food-plant

at maturity and attaches itself to the under side of rocks, where the ♀ makes the ovisac and probably hibernates till spring, when the young larvæ crawl away in search of food. This is the first *Exaretopus* found in America, and is from the highest altitude at which any Coccid has been found, it being above timber line on Mt. Shasta, between 9,000 and 10,000 feet.

A NEW SAWFLY OF THE GENUS XVELA.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

Mr. Ashmead has written thus of the Xyelidæ: "The imagoes appear very early in the year, or in February, March and April, deposit their eggs and then disappear, the consequence being that very few are taken, and only a few of the common forms are known." Of the genus *Xyela*, as now restricted, only one North American species, *X. minor*, Norton, has been described.

On May 1st of the present year, as we were going up to our classes in the Normal University at Las Vegas, N. M., my wife picked a small insect off my coat. It was at once transferred to the bottle which is never absent from the entomologist's person, and, upon inspection later, proved to be a new species of *Xyela*, herewith described:

Xyela luteopicta, n. sp.—♂. Length of body about 2½ mm.; head and thorax variegated with black and bright yellow; abdomen black or nearly so above, yellow on venter; legs pale orange; antennæ with the first three joints reddish-brown, the other (filiform) joints black; wings very large, hyaline and iridescent, nervures black, stigma (very large) sepia. Antennæ 12-jointed, not hairy; head bright yellow, the occiput, a small spot just above level of antennæ, lines passing from the antennæ to the ocelli, the ocellar region, and a broad short longitudinal band on each side between the ocelli and the eyes, black. Thorax yellow ventrally; black dorsally, with a large yellow pentagonal area, on which are two black spots, a black V pointing anteriorly, and an anterior weaker V pointing posteriorly. On one side the wing is abnormal, one of the recurrent nervures being obliterated.

NEW CYCLORHAPHOUS DIPTERA FROM MEXICO AND
NEW MEXICO.

BY D. W. COQUILLET, WASHINGTON, D. C.

In the course of identifying a series of Diptera received by Dr. L. O. Howard, and collected in Mexico and New Mexico by Mr. C. H. T. Townsend, a number of new forms were encountered, and as manuscript names of these will soon be sent out it is desirable that these forms should be duly characterized; accordingly, the descriptions are presented for publication herewith.

Family SYRPHIDÆ.

Spilomyia obscura, new species.

Head black, the face, frontal triangle of male and lower part of front of female, prolonged upward along the eyes to a point nearly opposite the lowest ocellus, yellow; antennæ yellowish brown, the joints subequal in length, arista yellow, mouth-parts black; thorax black, a yellow spot on each humerus and a smaller one above it, a vitta extends from each postalar callosity obliquely to the suture, where it is prolonged inward as a silvery white streak; a pair of oblique yellow spots in front of scutellum, a yellow spot on posterior part of mesopleura, one on the sternopleura, one above front coxa and a small prominence beneath insertion of wing; scutellum wholly black; abdomen black, a yellow spot on each side of the first segment, an interrupted yellow fascia on anterior part of the second, broadly dilated at the sides, a yellow streak in each hind angle of this segment, third and fourth segments with a yellow fascia on the front part and another on the hind margin, the former interrupted on the third segment, sixth segment of female, except the front margin, yellow; coxæ black, a yellow spot on outer side of the hind ones; femora yellow, the posterior side, except at the ends, black, least extended on the middle ones; tibiæ yellow, their apices and the tarsi yellowish brown; wings hyaline, costal margin to the spurious vein brown; length, 15 to 17 mm. A specimen of each sex collected August 27th and September 11th.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet).

Type.—Cat. No. 6290, U. S. National Museum.

Ocyptamus notatus, new species.

Head black, the face and broad sides of frontal triangle yellow, antennæ and proboscis black; body black, the prealar and postalar callosities, sides of scutellum, except at base, and a pair of circular or

oval spots on abdominal segments two to four, yellow, the spots on the second segment located between the centre and the lateral margin, those on the other two segments situated slightly in front of the middle; abdomen widest at base, subopaque, becoming somewhat polished posteriorly; front legs yellowish brown, ends of tibiae and first two joints of the tarsi yellow, middle and hind legs black, base of middle tibiae, first two joints of their tarsi and first three joints of the hind ones, yellow; wings hyaline, tinged with brown along the costa, the base and stigma dark brown, the costal cell dark gray; length, 12 mm. Four males collected February 24th and March 3rd to 9th.

Habitat.—Frontera, Tabasco, Mexico.

Type.—Cat. No. 6291, U. S. N. M.

Lycastirrhyncha Willistoni, new species.

Head black, with a slight bluish tinge, front thinly gray pruinose, crossed at middle by a velvet black fascia prolonged backward in the middle and at each end, a transverse row of four velvet black spots on vertex; face on upper part and the sides yellowish-gray pruinose, prolonged on sides of snout almost to its middle; antennae reddish yellow; eyes sparsely long haired on the upper part; body black, slightly tinged with bronze, thinly gray pruinose; mesonotum marked with three velvet black vittae, the median one complex, the lateral ones interrupted at the suture, behind which they are double; scutellum velvet black on basal half, second and third segments of abdomen with a pair of large yellow spots narrowly separated from the lateral margin, velvet black, narrow hind margin of fourth segment also yellow, this segment with three velvet black spots in the form of a triangle, two along the hind border and the other in the middle in front; legs black, the front and middle knees yellow, hind knees and first two joints of middle tarsi sometimes also yellow; wings hyaline; length, 7 to 8 mm. Three males collected February 12th to 14th.

Habitat.—Frontera, Tabasco, Mexico.

Type.—Cat. No. 6292, U. S. N. M.

Sphiximorpha ancoralis, new species.

Head black, upper edge of occiput, lower part of front, except a median line dilated at base of antennae and prolonged laterally on the face, and the face, except a median vitta, yellow; antennal process slender, dark brown; antennae brown, the joints subequal in length, the

first two-thirds as long as the antennal process; proboscis dark brown; body black, the humeri, antealar callosity, a short vitta above base of wing, large spot on posterior side of mesopleura, smaller one on upper part of sternopleura, small one on lower part of pteropleura, sometimes very indistinct, the scutellum, sides of first abdominal segment and posterior borders of the following three, yellow, that on the fourth only slightly and very gradually dilated in the middle; fourth segment marked with an interrupted gray pruinose fascia which is produced forward at the point of interruption, second segment as long as the third; legs reddish yellow, bases of the tibiæ broadly pale yellow; middle and hind femora, except their ends, sometimes dark brown, one or more of the joints of the tarsi sometimes also dark brown; wings hyaline, the costal border to the third vein pale brown, lightest in costal cell and in front of last section of third vein; length, 10 mm. Six males and five females, collected March 26th and August 24th to September 4th.

Habitat.—Las Cruces, New Mexico.

Type.—Cat. No. 6293, U. S. N. M.

Family CONOPIDÆ.

Myopa fenestrata, new species.

Head yellow, the front and occiput, except the sides and lower portion, orange yellow, sides of face each marked with two to four brown spots, the upper one contiguous to the eye, all rarely wanting, a brown stripe at each lower corner of front and five brown spots, two of which are near each eye on upper half of front, the fifth near centre of front, two or more of these spots sometimes coalesced; two brown spots near middle of each side of occiput, hairs of front and upper part of occiput black, on remainder of occiput, face and cheeks yellowish white, those on lower part of cheeks rather long and abundant; antennæ reddish yellow; palpi and first segment of proboscis black, remainder of proboscis reddish brown; body black, the inner part of the humeri, a streak behind each, a spot on each postalar callosity, several spots on pleura and the genitalia, reddish brown, a yellow stripe on either side of the metanotum; mesonotum thinly whitish pruinose, a distinct white spot near each corner and indications of a pair of whitish vittæ on the anterior portion, abdomen, except front angles of the segments, gray pruinose and with dark reflecting spots; legs black, coxæ marked with reddish, apices of femora, broad bases of middle and hind femora, bases and a median band on tibiæ, and whole of tarsi, yellow; base of wings to root of second

vein, extending along fifth vein to base of discal cell, bright yellow, remainder of wing from costa to fifth vein dark brown, a streak in outer half of discal cell, a fascia across middle of first posterior cell, sometimes interrupted, and nearly whole of second posterior cell, hyaline; wings behind fifth vein smoky gray; apex of first vein and the costa from apex of auxiliary to midway between apices of second and third veins, bright yellow; halteres yellow; length, 7 to 9 mm. Fifty-six specimens, of both sexes, collected August 11th to 27th.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, about 7,300 feet altitude).

Type.—Cat. No. 6294, U. S. N. M.

Myopa pulchra, new species.

Differs from *fenestrata* as follows: Sides of face with only the uppermost brown spot, sides and hind margin of mesonotum, entire scutellum, broad sides of first two abdominal segments, front corners of the third and middle of the last segment, yellow; mesonotum marked with four velvet black vittæ; yellow on bases of wings more extended, including the fourth vein to base of discal cell, hyaline fascia of first posterior cell reduced to a subtriangular spot next to the fourth vein, wings behind fifth vein nearly pure hyaline; length, 8 mm. Five specimens, of both sexes, collected August 26th to September 2nd.

Habitat.—Same as the preceding species.

Type.—Cat. No. 6295, U. S. N. M.

Sicus brevirostris, new species.

Face and cheeks pale yellow, front reddish yellow, the upper corners and occiput black, antennæ reddish yellow, inserted nearly length of last two joints from the adjacent eye, first and third joints slightly longer than broad, the second as wide as long, slightly shorter than the third, mouth-parts black, last section of proboscis less than one-third as long as the preceding section; body black, grayish pruinose, apex in male and whole of genitalia of female polished, second and third abdominal segments in the male in ground colour largely yellow; legs black, the knees yellow; wings hyaline, tinged with gray at the base and in the costal cell, first posterior cell closed and petiolate; halteres yellow; length, 4 mm. Four males and three females collected August 29th to September 7th.

Habitat.—Same as the preceding species.

Type.—Cat. No. 6296, U. S. N. M.

This European genus has not previously been recorded from this continent.

Zodion perlongum, new species.

Front and middle of upper part of occiput reddish yellow, remainder of occiput black, changing to yellow below, gray pruinose, face and cheeks light yellow, antennæ reddish yellow, first joint wider than long, the others slightly longer than wide, the second a trifle longer than the third, arista black, the apical half whitish, proboscis black; thorax and scutellum black, gray pruinose, mesonotum marked with two velvet black vittæ and with three dark vittæ between them and an interrupted one outside of each of the two black ones; abdomen narrower than, but fully twice as long as, the thorax, black, the second segment largely yellow, dorsum of abdomen yellowish-gray pruinose, the under side and last segment of genitalia polished; abdomen widest at base of second segment, tapering posteriorly to about half this width, segments two to four noticeably longer than wide, the third one and one-half times as long as wide; legs reddish yellow, upper sides of femora largely black, last tarsal joint dark brown; wings hyaline, tinged with gray at the base, halteres yellow; length, 8 mm. Four females.

Habitat.—White Mts., New Mexico (Rio Ruidoso, about 6,700 feet altitude, July 27th); Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdas, about 7,300 feet altitude, August 26th); and Colorado (H. K. Morrison).

Type.—Cat. No. 6297, U. S. N. M.

Family TACHINIDÆ.

Comatacta, new genus.

Near *Siphosturmiæ*, but the antennæ reaching only slightly more than two-thirds of distance to the oral margin and the thorax densely covered with rather long yellowish and white hairs; head at vibrissæ longer than at base of antennæ, vibrissæ on a level with anterior edge of oral margin, one or two bristles above each, sides of face bare, each nearly half as wide as the facial depression, frontal bristles descending nearly to apex of second antennal joint, no ocellar bristles, two pairs of orbital bristles in the female, wanting in the male, third joint of antennæ slightly over twice as long as the second, arista pubescent toward base, the longest slightly longer than greatest diameter of arista, penultimate joint of arista broader than long, cheeks about one-sixth as wide as the eye-height, eyes bare, proboscis slender, the portion beyond the basal

articulation shorter than height of head, labella small, palpi short, clavate; hind tibiae evenly ciliate with rather short bristles on the anterior-outer side; first posterior cell open, ending noticeably before the wing-tip, bend of fourth vein without an appendage, hind crossvein nearer to the bend than to the small crossvein, base of third vein bearing a single bristle, other veins bare.

Type.—*Brachycoma pallidula*, v. d. Wulp (Biol. Cent.-Am., II., p. 95), from Yucatan, Mexico. Five males and eight females are before me from San Rafael, Vera Cruz, Mexico.

Microphthalma pruinosa, new species.

Head yellow, occiput and sides of front black, the latter yellowish pruinose, frontal vitta brownish black; vertex one-third as wide as either eye, sides of face sparsely covered with black bristly hairs, antennae nearly half as long as the face, yellow, the third joint, except at base, black, nearly twice as long as the second, vibrissae near one-third of distance from anterior oral margin to base of antennae, cheeks posteriorly about as wide as the eye-height, palpi yellow, proboscis dark brown; body wholly grayish pruinose, black, the broad sides of abdomen and the genitalia yellow, mesonotum marked with four black vittae, three post-sutural dorsocentral bristles, three sternopleurals, second and third abdominal segments bearing marginal bristles, the fourth covered on the apical half; legs black, tibiae largely yellow, pulvilli greatly elongate; wings hyaline, tinged with yellowish brown at base and along the veins, costal spine very long, a long stump at bend of fourth vein, calypteres whitish; length, 9 to 12 mm. Four males.

Habitat.—White Mts., New Mexico (South Fork Eagle Creek, altitude about 8,000 feet, August 13th); and Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet, July 19th).

Type.—Cat. No. 6298, U. S. N. M.

Araba nebulosa, new species.

Black, including the palpi; front golden-yellow pruinose, greatly narrowed anteriorly, vertex three-fourths as wide as either eye, uppermost frontal bristle in each row over twice as far from the one in the opposite row as from the adjacent eye, a reclinate bristle between it and the eye, two pairs of orbital bristles, sides of face bearing a row of short black hairs near the eye, ridges bristly on the lower three-fifths, frontals descending to middle of second antennal joint, antennae slightly shorter than the face, the third joint four times as long as the second, arista

thickened nearly to the middle; thorax gray pruinose, marked with five black vittæ, the three median ones reaching slightly beyond the suture and appearing confluent when viewed from behind, three pairs of post-sutural dorsocentral bristles, two sternopleurals, scutellum gray pruinose, the sides broadly velvet black, abdomen gray pruinose, the first three segments with a transverse row of five velvet black spots, broad apex of the fourth segment polished, second and third segments with a marginal pair, the fourth with a marginal row of bristles; first joint of front tarsi shorter than the second and greatly thickened, the lower outer angle bearing a cluster of rather long yellow bristly hairs, pulvilli one-third as long as the last tarsal joint, hind tibiæ outwardly somewhat ciliate with bristles of an unequal length; wings hyaline, a small brown spot at apex of first vein, a larger one at small crossvein, prolonged toward apex of discal cell, a narrow one in outer lower corner of this cell, a large spot at apex of second vein and on bend of fourth vein, the latter furnished with a rather long appendage, the vein beyond it nearly straight, terminating a short distance before the extreme tip of wing; length, 5 mm. Four specimens collected May 31st.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet).

Type.—Cat. No. 6299, U. S. N. M.

Family DEXIDÆ.

Trixodes, new genus.

Head in profile nearly hemispherical, front rather prominent, face strongly retreating below, facial depression nearly elliptical in outline, a rather low, broad median carina, vibrissæ absent, vibrissal angles widely separated, situated the length of the antennæ above the anterior oral margin, ridges bare, antennæ less than one-fourth length of face, the second and third joints of nearly an equal length, arista bearing a few hairs, the longest of which are nearly twice as long as greatest diameter of arista, penultimate joint of the latter as broad as long, frontal bristles descending nearly to middle of second antennal joint, ocellar and post-ocellar bristles small or wanting, only one pair of verticals, sides of face on upper half bare, the remainder and the cheeks sparsely covered with short bristly hairs, cheeks four-fifths as wide as the eye-height, eyes bare, proboscis one-fourth as long as height of head, rather robust, labella small, palpi short clavate; bristles of tibiæ very short, hind tibiæ not ciliate with bristles; third vein bristly on the basal fourth of first section,

other veins bare, first posterior cell open, ending far before the wing-tip, hind crossvein much nearer bend of fourth vein than to small crossvein, this bend angular and without an appendage, costa bare, no costal spine. Type, the following species:

Trixodes obesa, new species.

Dark brown, apex of palpi yellow; vertex of male as wide as either eye, in the female one and one-fourth times as wide, no orbital bristles; head, except the frontal vitta, thinly grayish pruinose, mesonotum thinly gray pruinose, marked with four black vittæ, bristles very short, five pairs of postsutural dorsocentral bristles, abdomen very thinly grayish pruinose, the bristles very short, marginal ones on the third and sometimes on the second segment; front pulvilli of male rather elongate, but much shorter than the last tarsal joint; wings hyaline, the base as far as base of discal cell pale brown, crossveins faintly clouded with brown; calypteres brown; length, 16 to 19 mm. Two males and two females.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, September 9th); and West Fork Gila River, New Mexico (July 13th).

Type.—Cat. No. 6300, U. S. N. M.

Mochlosoma rufipes, new species.

Black, the antennæ, face, cheeks, palpi, humeri, scutellum, femora and tibiæ reddish yellow, frontal vitta deep brown, with a tinge of yellow; vertex as broad as either eye, two pairs of orbital bristles, sides of front and face, except the lower part, densely gray pruinose, upper-inner fourth of face sparsely covered with short bristly hairs, antennæ two-fifths as long as the face, the second joint as long as the third, arista long plumose, cheeks three-fourths as broad as the eye-height, proboscis setaceous, the portion beyond the articulation twice as long as height of head; mesonotum gray pruinose and with five blackish vittæ, scutellum thinly, abdomen densely, gray pruinose, the latter with dark olivaceous reflecting spots, second and third segments with discal and marginal bristles, the fourth sparsely covered, except on the extreme base; wings hyaline, the base whitish, bend of fourth vein arcuate, calypteres white; length, 13 mm. Eight females.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, about 7,300 feet altitude, September 5th to 18th).

Type.—Cat. No. 6301, U. S. N. M.

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 Vespidae, 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 Vespidae, has reached its greatest development in warm or tropical countries.

Our knowledge of this family, as well as of the *Vespidae* and *Masaridae*, 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*, *Vespidae* and *Masaridae*.

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 sawflies 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 *Eumenidae* four distinct subfamilies:

Table of Subfamilies.

- | | |
|--|--------------------------------|
| 1. Middle tibiae with <i>two</i> apical spurs. | 2. |
| Middle tibiae with <i>one</i> 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.—Ischnogasterinae. |
| Second cubital never oblong or quadrate, always <i>much</i> narrowed above; claws cleft. | Subfamily II.—Discoelinae. |
| Second and third cubital cells each receiving a recurrent nervure. | Subfamily III.—Raphiglossinae. |
| 3. Second cubital cell receiving both recurrent nervures. | Subfamily IV.—Eumeninae. |

SUBFAMILY I.—Ischnogasterinae.

The two spurred middle tibiae separate this subfamily from the *Eumenidae*; the second cubital cell receiving *both* recurrent nervures, separates it from the *Raphiglossinae*, which have the second and third cubital cells each receiving a recurrent nervure; while from the *Discoelinae*, 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.—Discoeliinae.

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, Latreille.
(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.—Raphiglossinae.

In this subfamily the middle tibiae 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 sessile, 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.—Eumeninae.

To this subfamily belong all Eumenids having the middle tibiae 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 *Eumeninae*. 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*, Wesmæl.
(Type *Vespa sinuata*, Fabr.)

THE MAPLE COTTONY PHENACOCOCCUS.

BY GEO. B. KING, LAWRENCE, MASS.

Phenacoccus acericola, n. sp.

Since 1880, when the above-named species was found and described as the European *Pseudococcus aceris*, Geoff. (*Phenacoccus*), by Miss Emily A. Smith, it has until recently been supposed to have been that species.

The latter part of 1890, Prof. Cockerell wrote me that he believed our species was distinct from that of Europe, and suggested that I should describe it as new if upon further investigation no reason appeared to the contrary. At the meeting of the Association of Economic Entomologists of 1891, at Denver, Colorado, he speaks of it as being without a name.

As I knew of no place in the vicinity where I live, I asked Dr. George Dimmock, of Springfield, Mass., if he would kindly collect and send me some specimens for study, which he did last season. The following description is from the material sent, together with some descriptive notes taken from Dr. Howard's excellent account given in "Insect Life." The first account of the *Maple Cottony Phenacoccus* appeared in the "North American Entomologist," April, 1880, by Miss Emily A. Smith. The second was by Prof. Comstock in his work published in the annual report of the U. S. Department of Agriculture for 1881, and the third by Dr. Howard in "Insect Life," 1894. It seems quite evident that Dr. Howard had some doubt about the identity of the species, and calls attention to some of the characters which seemed to differ from Signoret's account of the European *Phenacoccus aceris*, Geoff.

Our American species when seen on the leaves appear as an irregular oval cottony mass which adheres to anything touching it and resembles very much the cottony ovisac of a *Pulvinaria*. The cottony material is about 6 mm. in diameter and covers the insect and her eggs.

Length of ♀ about 5 mm. long, 3 broad, plump, light yellow. Boiled in caustic potash, they turn orange red. The internal juice pressed out, the skin is colourless. The upper surface of the body is more or less covered with spinnerets and these are more dense at the posterior extremity. The margin of the body has several groups of short spines. Antennæ 9 jointed, measuring in μ :

Joints	1.	2.	3.	4.	5.	6.	7.	8.	9.
	44.	44.	44.	30.	40.	32.	32.	28.	64.
	44.	44.	44.	32.	44.	32.	28.	28.	64.

Joint 9 is longest, 3 and 5 equal, 6 and 8 usually equal, 1 and 2 and 3 are equal and longer than any of the next five joints. The last sending in the fall, when the leaves were found on the ground, had well advanced females with their abdomen well filled with eggs, and when cleared with potash they showed only an 8 jointed antenna as follows:

Joints (1) 40. (2) 60. (3) 48. (4) 72. (5) 40. (6) 40. (7) 28. (8) 60. Middle leg, coxa 120, femur and trochanter 240, tibia 200, tarsus 80. The legs are somewhat slender, and the claws are thin, sharp, thickened at the back, but not toothed as described by Prof. Comstock.

Distribution.—So far as known to me, the following are the only localities where the species have been found:

Peoria, Ill., Miss Emily A. Smith; Lancaster, Pa., Dr. Rathvon; Mount Carmel, Illinois, Prof. W. G. Johnson; Kingston, R. I., Prof. L. F. Kinney; New Jersey, Dr. John B. Smith; Cumberland, Maryland, Prof. W. G. Johnson; Albany, Athens, Brooklyn and Middleton, N. Y., Prof. E. P. Felt; Jamaica Plain and Brookline, Mass., Mr. John G. Jack; Springfield and Holyoke, Mass., R. A. Cooley.

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THE EGG OF THE WATER SCORPION (*RANATRA FUSCA*).

BY R. H. PETTIT, AGRICULTURAL COLLEGE, MICH.

In his "Insect Book," Dr. L. O. Howard states that the egg of *Ranatra* has not as yet been described from the United States. It is hoped that the following note may be of interest to someone:

On June 24, 1900, the writer was so fortunate as to find a large number of these eggs at Pine Lake, near Lansing, Mich. As the eggs were not recognized at first, they were allowed to hatch, and the nymphs allowed to become about half-grown.

The eggs are white in colour, long oval in form (about $3\frac{1}{2}$ mm. long), with two long spindle-like appendages (about 4 mm. long) at one end. The surface is nearly smooth, not glossy, and covered with many slightly raised rounded elevations, visible when greatly magnified. The eggs are placed quite abundantly in the rotting stems of reeds and cat-tails, several inches under the surface of the water, the egg itself usually being almost out of sight, only the appendages being noticeable. Where they are numerous, the effect is that of a small cheval-de-frise.

No connection seems to exist between the interior part of the egg and the processes. The latter seem to be appendages of the outer shell alone, and their purpose that of protection against predatory vertebrates.

The young nymph is provided with a short anal process at birth. This process is deeply grooved on the ventral surface.



FIG. 11.



FIG. 12.

Fig. 11 shows a piece of aquatic plant with the eggs slightly enlarged in situ. Fig. 12 shows several of the eggs magnified about $4\frac{1}{4}$ times.

LIFE-HISTORY OF LYDA FASCIATA (NORTON), FAM.
TENTHREDINIDÆ.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

Full-grown larvæ were taken on wild cherry (*Prunus*) in the latter part of September, 1901. Placed in a box over earth, they fed but a day or two, turned a deep green, and, entering the earth two to three inches, formed rounded cells, in which they remained as larvæ all winter, transforming to pupæ just before emergence. They are gregarious, remaining in their web, filled with its mass of exuvia, until full-grown, when, as their growth is completed, individually they drop from it and enter the ground. One which was kept under observation formed a pupa on April 28th, and emerged eight days thereafter. The pupal skin is very thin, showing distinctly the parts of the enclosed imago. This brood commenced emerging April 25th, and a few individuals are still coming out, May 31st. In the earlier days the males predominated, later the females. Altogether, 134 males and 123 females have appeared. Copulation took place at once, the pair remaining in coitu from three to five hours. One female (the first observed) was furnished with a spray of wild cherry, and on the night of the 13th of May deposited 76 eggs on the under side of a leaf, extending from the tip half its length. They were laid side by side, in rows of five to seven, from midrib to margin, and in little slits cut in the epidermis of the leaf, being attached by a gummy secretion.

Egg.—Size 1.5 x .5 mm. Sordid white, glossy, and apparently smooth, opaque.

Hatched May 22nd, turning to a bright yellow the day before. The young larvæ do not eat the egg shells.

First Stage.—Head round, shining, black at vertex, face and mouth-parts paler, eyes black. Body dull orange, deeper along an enlarged substigmatal wrinkled fold, which extends the entire length, giving the body a flattened appearance. Thoracic feet and anal plates black. Above the eyes are movable 3-jointed antennal-like processes, already mentioned by Packard (5th Report U. S. Entom. Commission), his figure, without doubt, referring to this species. Attached to the sides of the upper anal plate are two similar processes, but apparently 5-jointed. The young larvæ immediately congregate and begin to spin a web, attaching another leaf, if possible, to form their domicile, and attack the edges of the leaf, consuming all parts of it. Length, .12.

May 23. Second stage.—Head darker, a depression on the face between the eyes. Otherwise unchanged. Length .16.

May 25. Third stage much as before. Length .21.

May 27. Fourth stage.—In this stage the black colour of the head, ventral plates, thoracic feet and antennal appendages is intensified. The substigmatal fold becomes thicker and more solid in colour. The spiracles and a series of broken yellowish lines on each segment subdorsally make a faint lateral stripe, dorsally and sublaterally translucent dull greenish. Length .33.

May 29. Fifth stage.—Much the same as before. One larva discovered moulting. The head apparently splits apart vertically at the mouth without previous visible distension. After moult the skin is partially eaten, but the head-covers remain in the web. The body of the larva retains its normal colours, but the head and ventral plates with their appendages are glassy and colourless, except the eyes, which are black, and a faint tinge of black about the mouth, and remains so for several hours after moult. Length .56.

May 31. Sixth stage.—A decided thickening of substigmatal fold, which now becomes a reddish orange. The broken markings above it and the subdorsal lines are also heavier and more solid in colour. Translucent intervals darker and presenting a slightly shagreened appearance. Instead of being rounded, the upper ventral plate now has a central triangular depression, in the bottom of which is set a short movable spine. This space is dusky yellow. The lower ventral plate has a depression on each side of a rounded longitudinal ridge, with the bottom confusedly punctured. Edge of both plates set sparsely with strong, black setae. Length .84.

June 12. Seventh stage.—Much as before. Body strongly wrinkled. Thoracic legs and antennal appendages now translucent greenish, ringed lightly with black at the joint. Length, 1.15.

June 14. Eighth stage.—Not changed, except that the thoracic legs are ringed with orange. The tubercles on the 11th segment have increased in size with later moults, but none others seem prominent. Length, 1.35.

After feeding two days without further moult, the larvæ as they mature turn a deep green, except the head and anal plates, which remain shining black, feet translucent. At this time they drop from the web and enter the ground for æstivation, there being in our section a spring and fall

brood. These larvæ, if placed on any flat surface, turn on their backs and begin at once to web the body fast to it, pushing themselves along under the web with the aid of the folds of the body and the jointed appendages of the anal plates. From my observations I believe this to be the purpose for which these appendages are supplied, supplemented at later stages, when its body becomes heavier, by the spinous process placed on the *upper* anal plate. After falling from the web and seeking to enter the ground, it assumes the normal position, hitching itself along on its ventral surface with the aid of its head and thoracic legs.

Some of the larvæ of the 1901 brood remain unchanged in their cell at this date, June 16th, and, I presume, will not appear as imagoes until the autumn, thus insuring, as do lepidopterous larvæ, a perpetuation of the species.

LARVA OF DATANA FROM ARIZONA IDENTIFIED.

In the March number of THE CANADIAN ENTOMOLOGIST, page 74, I described a, to me, unknown larva, which, according to a statement of Mr. Wm. Beutenmuller, of the American Museum of Natural History of New York, is that of *Datana robusta*, Strecker. Heretofore the imagoes of *D. robusta* had all been taken in Texas, and Dr. Dyar in Prof. Packard's *Bombycine Moths*, Vol. I., page 120, is quoted as saying that the larva of *Robusta* was yet unknown. Some have claimed that the species described as *Robusta* too much resembled *Perspicua*, but it will be seen that the larva is distinct, and the imagines of both these species are entitled to the names as first described. The body colour of *Robusta* larva is *black*, and the lines are *yellow*. *Perspicua* larva has a body of *straw* or *lemon yellow* and eleven *pitchy reddish* lines in the 3rd or 4th stage, and in the 5th stage the body is of the same colour, but the lines are *blackish red*, according to Mr. James Angus. In the third stage of *Perspicua* larva, as described by Dr. Dyar, the body colour is *dark red* and the stripes *bright yellow*.

Mr. Beutenmuller wishes it to be known that he alone is responsible that these two larvæ were not turned over to Mr. L. H. Joutel for figuring. He was on the point of departing from the city, and the larvæ having already contracted, he did not think they would then serve the purpose.

R. E. KUNZE, Phœnix, Arizona.

NOTES ON CICINDELÆ IN NORTH CAROLINA.

BY EDWARD D. HARRIS, NEW YORK.

In the early part of May of the present year (1902) the writer made an attempt to collect Cicindelæ in the pine belt of North Carolina. While opportunities for observing the distribution of species were too meagre to be of much practical value, certain facts were noted that may be of interest to those studying the genus.

The first locality visited was Jamestown, a station on the line of the Southern Railway, distant about 220 miles from the coast and 40 from the Virginia line. On the sand bars and banks of Deep River, a tributary of Cape Fear River, beautiful specimens of *repanda* were taken in abundance. A single *duodecimguttata* and a single *vulgaris* of the typical size were taken on the same ground, and a few specimens of *sexguttata*, both six- and eight-spotted, on sandy paths along the wooded banks of the river.

At High Point, in the woods eight miles distant, *repanda*, *sexguttata* and *vulgaris* occurred, a single specimen of the latter being noticeable for its small size. Charlotte, the next point visited, 15 miles from the South Carolina line, afforded in its suburbs excellent collecting ground. Along the edges of a creek of formidable dimensions, that showed unmistakable evidences of often breaking through its bounds, *repanda* and *duodecimguttata* were taken, the former in an unusual range of size. Here also occurred *vulgaris* in abundance, most of the specimens in both sexes being so small as to warrant special notice. Many of the males were scarcely larger than the typical *repanda*, and the average in size falls so far below that of the species as generally noted as to indicate the existence here of a sub-race. The maculations are noticeably attenuated, and in some of the specimens there appears a distinct tendency to their obliteration. The humeral lunule is generally either broken or the anterior portion wholly absent.

The three collecting points heretofore noted are west of, and not to be considered as included in, the pine belt of the State. Hamlet, 75 miles to the east of Charlotte, and less than 10 miles from the South Carolina line, is in the heart of the turpentine lands. Here the pine timber abounds—forests of magnificent trees, free from underbrush and plentifully watered.

At this point a most interesting form of *C. scutellaris* was taken. In colour it is somewhat suggestive of *rugifrons*, but, while being unicolorous, is not so intense a green or blue. The maculations, however, differ

from *rugifrons*. In the majority of specimens taken there is an apical lunule well defined, and sometimes the marginal dot appears. Other specimens are immaculate, and, were it not that they occur with those that are marked, would be placed as *C. unicolor*.

Vulgaris and *repanda*, the former of the typical size, were also taken at this locality.

In passing from Hamlet to the seacoast, 115 miles, one journeys directly through the pine district, which extends nearly the whole distance. There is little doubt that this form of *C. scutellaris* can be taken at numerous points over the entire field. At Montague, 17 miles from the coast, on sandy patches beneath the pine trees, although the weather was unfavourable, two specimens of the same insect were taken, having the apical lunule and small marginal dot.

Vulgaris was common here, the larger number of specimens being of the normal size.

The ocean beach opposite Wilmington was wholly bare of the genus. Goldsboro' was the last collecting point on the trip. *Sexguttata* was taken here in the woods for the only time since leaving High Point. It appears to be absent in the pine belt. Here also occurred *modesta* and *vulgaris*, both in the roads, the latter of the dwarfed form found at Charlotte.

BOOK NOTICE.

THE COMMON SPIDERS OF THE UNITED STATES.—By J. H. Emerton ; Ginn & Co., Boston, Mass., 1902 ; 8vo., pp. 225, figs. 501.

This is a most welcome addition to the few books on the spiders of the United States. It is based on the author's previous papers on the New England spiders that have appeared during the past twenty years in the Transactions of the Connecticut Academy. Some species from the Southern States have been added, so that the work describes about 200 of the commoner spiders of the North-eastern United States, and Canada. There is an excellent introduction, which we wish were longer, and a short, general treatment of each family. Under the family each species is described in simple yet distinct language, and each species is figured. The abundance and excellence of these figures greatly enhance the value of the book, and make the determination of many of our common spiders a very easy matter. There are also many fine photographs of spider-webs, which indicate, as only photographs can, the beauty and complexity of these delicate structures. The classification adopted is that used by Blackwall many years ago, and the generic and specific names are sometimes out-of-date. The book is nicely gotten up, well printed, and with an appropriate cover-design representing a remarkable new genus of blind Thomisidæ.

NATHAN BANKS.

Mailed August 2nd, 1902.