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## TABLES FOR THE DETERMINATION OF THE GENERA OF COCCIDÆ.

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

### SUBFAMILIES.

- Males with compound eyes. . . . . 1.  
Males with simple eyes. . . . . 3.  
1. Anal ring with hairs (♀). . . . . *Ortheziinae*.  
Anal ring hairless (♀). . . . . 2.  
2. Mouth-parts present in adult ♀; legs present in all  
stages. . . . . *Monophlebinae*.  
Mouth-parts absent in adult ♀; legs absent in intermediate stage  
of ♀. . . . . *Margarodinae*.  
3. Abdomen of ♀ terminating in a compound segment; anal orifice  
hairless. . . . . 4.  
Abdomen of ♀ not so terminating. . . . . 5.  
4. Insects with a scale formed entirely of secretory matter without  
admixture of the exuviae; adult ♀ retaining legs and  
antennæ. . . . . *Conchaspinae*.  
Insects with a scale composed partly of the exuviae; adult ♀ with-  
out legs. . . . . *Diaspinae*.  
5. Insects enclosed in a resinous cell with three orifices; adult ♀  
apodous, with the terminal segments produced into a tail-like organ,  
bearing at the extremity the anal orifice; a prominent spinelike  
organ above the base of the caudal extension. . . . . *Tachardiinae*.  
Not so. . . . . 6.  
6. Females with the posterior extremity cleft; anal orifice closed above  
by a pair of triangular plates. . . . . *Lecaniinae*.  
Not so; triangular anal plates absent. . . . . *Coccinae*.

In preparing the above table, I have borrowed in places from that of  
Green, *Coccidæ of Ceylon*, p. 12.

## ORTHEZIINÆ.†

- ♀ antennæ 8-jointed . . . . . *Orthezia*, Bosc.\*  
 ♀ antennæ 4-jointed . . . . . *Ortheziola*, Sulc.

## MONOPHLEBINÆ.

- ♀ with a long posterior ovisac; ♂ without fleshy caudal processes . . . 1.  
 ♀ with conspicuous waxy lamellæ or processes more or less covering the dorsal surface, but no long ovisac; ♂ unknown . . . *Walkeriana*, Sign.  
 ♀ without a long posterior ovisac, or the lamellæ of *Walkeriana* . . . . 2.  
 1. Antennæ of adult ♀ 11-jointed . . . . . *Icerya*, Sign  
 Antennæ of adult ♀ 9-10-jointed . . . . . *Proticerya*, Ckll.  
 2. ♂ abdomen without long fleshy processes . . . . . *Palæococcus*, Ckll.  
 ♂ abdomen with long fleshy processes, usually 8 in number . . . . . *Monophlebus*, Leach.

There are several other supposed genera in the books. *Crypticerya*, Ckll., is essentially an *Icerya* without an ovisac; in the table it will fall with *Palæococcus*, but having no material of the latter genus, I am not sure whether the two are identical. *C. Townsendi*, var. *pluchea*, has rows of waxy processes, clearly indicating an approach to the condition of *Walkeriana polei*.

*Llaveia*, Sign., *Ortonia*, Sign., *Protortonia*, Towns., *Guerinia*, Targ., and *Tessarobelus*, Mont., seem all to be identical with *Monophlebus*. *Drosicha*, Walk., is said to differ from *Monophlebus* by its 9-jointed antennæ, but it is doubtless an immature form of the latter genus.

The Monophlebinæ are really separable into two distinct tribes: (1) *Monophlebini*, in which the males have fleshy caudal processes, and the secretion of the females is powdery or cottony, including only *Monophlebus*; and (2) *Iceryini*, in which the males have not the fleshy processes, and the secretion of the females is more in the form of waxy plates, including *Icerya*, *Walkeriana*, etc.

†By the characters given, *Phenacoleachia*, n. g. (type *Leachia zealandica*, Maskell, Tr. N. Z. Inst., XXIII., p. 26), will fall in this subfamily, but it has strongly Dactylopiine features. Of this *Phenacoleachia zealandica* I have males, received from Mr. Maskell, and there is a slide of the females, from the same source, in the collection of the U. S. Department of Agriculture. The female resembles that of *Dactylopius*, having two long caudal filaments as in that genus, instead of the brush of *Orthezia*; but it has curious compound eyes consisting of ocelliform bodies forming a single ring round the head, interrupted above and below. The adult female, by its elongated form, elongated mentum, and curved spines at the end of the antennæ, resembles *Rhizococcus*; but it differs in its 11-jointed antennæ (Maskell, l. c., Pl. VI., f. 3). The anal ring bears six stout bristles.

\*An overlooked synonym of *Orthezia* is *Cyphoma*, Gistel, 1848, Nat. des Thier., p. 151. Type *O. characiæ*. (Not *Cyphoma*, Boll., 1798).

MARGARODINÆ.

*Tribes.*

- Subterranean ; anterior legs of both sexes adapted for digging ..... *Margarodini*.  
 Arboreal ; anterior legs normal ..... *Xylococcini*.

*Margarodini.*

Includes only *Margarodes*, Guilding (syn. *Porphyrophora*, Brandt.).

*Xylococcini.*

- ♂ with no caudal brush ..... *Cælostoma*, Mask.  
 ♂ with a caudal brush ..... I.  
 1. Antennæ of adult ♀ 9-jointed ; temperate region of N. Hemisphere ..... *Xylococcus*, Lw.  
 Antennæ of adult ♀ 10- or 11-jointed ; Australia.. *Callipappus*, Guèr.

CONCHASPINÆ.

Includes only *Conchaspis*, Ckll. *Ourococcus*, Fuller, has not been described ; but a specimen of *O. casuarinæ* received from Mr. Fuller has a good deal of resemblance, in its caudal structures, to *Conchaspis*, but is yet quite distinct from it. The ♀ *Ourococcus*, very differently from *Conchaspis*, has a long glassy tail.

COCCINÆ.

*Tribes.*

- Living in galls in Australia ; end of abdomen produced into a narrow tail ..... *Brachyscelini*.  
 Either not living in galls, or end of abdomen not specially modified to form a tail ..... I.  
 1. ♀ enclosed in a complete sac of waxy or horny texture ; skin usually with figure-of-8 glands ; legs absent in adult ; larva not fringed with spines ..... *Asterolecaniini*.  
 ♀ globular or reniform, in a hard shell ; anal ring with hairs in larva, but not in adult ; larva fringed with spines ..... *Kermesini*.  
 ♀ not enclosed in a hard shell or waxy or horny sac ; or if enclosed (*Porococcus*, *Cryptoripersia*), antennæ and legs present ..... 2.  
 2. Newly-hatched larva with rows of dorsal spines ..... *Eriococcini*.  
 Newly-hatched larva without rows of dorsal spines ..... *Dactylopiini*.

*Brachyscelini.*

- On *Casuarina* ; larva not fringed with spines ..... *Frenchia*, Mask.  
 On *Eucalyptus* ; larva fringed with spines ..... I.

1. Legs all present, but short and unfit for use . . . . . *Apiomorpha*, Rüb.  
 Hind legs only present, these long . . . . . *Opisthoscelis*, Schrad.  
 Legs all absent . . . . . *Ascelis*, Schrad.

The genus *Cystococcus*, Fuller, has not yet been sufficiently described to be included in the tables. It forms spherical galls on *Eucalyptus*, and has neither legs nor antennæ.

*Asterolecaniini.*

Insect with a fringe of glassy rods . . . . . *Asterolecanium*, Targ.

Insect without such a fringe . . . . . 1.

1. Antennæ well-developed in adult ♀ . . . . . *Lecaniodiaspis*, Targ.

Antennæ rudimentary or absent in adult ♀ . . . . . 2.

2. Covering waxy; end of abdomen strongly chitinous . . *Cerococcus*, Comst.

Covering horny; end of abdomen not or hardly chitinous; scale with a caudal process ending with an orifice . . . *Solenococcus*, Ckll.

(*Solenophora*, Mask.)

Covering waxy; end of abdomen not chitinous; scale irregular, with no caudal process . . . . . *Pollinia*, Targ.

*Kermesini.*

Contains only one genus, *Kermes*, Boitard. By the larva, this appears to be allied to the *Eriococcini*; whereas the larvæ of the *Asterolecaniini* show them to be allied to the *Dactylopiini*. *Kermes* has no triangular anal plates in any stage, and is not related to the *Lecaniinae*.

*Eriococcini.*

Anal ring with hairs . . . . . 1.

Anal ring without hairs . . . . . 4.

1. Antennæ and legs absent in adult ♀ . . . . . *Nidularia*, Targ.\*

Antennæ and legs well formed in adult . . . . . 2.

2. Adult naked to the last . . . . . *Rhizococcus*, Sign.

Adult surrounded by cotton, but dorsally naked . . . *Gossyparia*, Sign.

Adult contained in a hard black scale . . . . . *Porococcus*, Ckll.

Adult living in a gall on oak; antennæ 6 jointed; tarsi 2-jointed; skin with figure-of-8 glands . . . . . *Olliffiella*, Ckll.

Adult forming a cottony sac . . . . . 3.

3. Anal ring with 8 hairs; caudal lobes long . . . . . *Eriococcus*, Targ. §

\*I suppose this belongs to *Eriococcini*, but the larval characters are not sufficiently known. The adult is naked, resting on a cushion of cotton, which surrounds it, as in *Gossyparia*, from which it is distinguished by lacking legs and antennæ.

§The subgenus *Thekes*, Crawford (type *E. eucalypti*), has 7-jointed antennæ; those of typical *Eriococcus* are 6-jointed.

- Anal ring with 6 hairs ; no caudal lobes . . . . . *Gymnococcus*, Dougl.  
 4. Legs and antennæ present and well-developed in adult ; skin with  
 grouped glands and truncate spines ; last joint of larval antenna  
 long . . . . . *Pseudococcus*, Westw.  
 (*Coccus*, Sign.)

Antennæ present, but only one pair of legs . . . . . 5.

Antennæ and legs absent ; not living in a gall ; newly-hatched larva  
 with four rows of dorsal spines on each side of the middle  
 line . . . . . *Carpochloroides*, Ckll.

5. Only the hind legs present ; skin without grouped glands or truncate  
 spines ; newly-hatched larva with only one complete row of dorsal  
 spines on each side of the middle-line, but one or two other rows  
 partially developed anteriorly . . . . . *Capulinia*, Sign.

Only the first pair of legs present, these very short ; living in a gall ;  
 newly-hatched larva with two rows of dorsal spines on each side of  
 the middle-line ; shape of adult elongate, with parallel sides,  
 abdomen with long hairs . . . . . *Cylindrococcus*, Mask.

*Olliffia*, Fuller, not yet described, is very close to *Eriococcus*.

*Dactylopiini.*

Anal ring without hairs . . . . . 1.

Anal ring with hairs . . . . . 2.

1. Adult ♀ with all the legs present ; first four small, hind pair very  
 large ; margin with spines . . . . . *Sphaerococcopsis*, Ckll. †

Adult ♀ with the antennæ minute, conical ; legs entirely absent ; skin  
 with many circular glands . . . . . *Sphaerococcus*, Mask.

(Type *S. casuarine*, Mask.)

Adult ♀ with the antennæ reduced to a mere tubercle ; spiracles  
 small ; legs absent ; skin tuberculate, but without conspicuous  
 glands . . . . . *Phœnicoccus*, Ckll.

(Type *P. Marlatti*, Ckll.)

2. With well-formed legs and antennæ in adult . . . . . 3.

Legs and antennæ absent or rudimentary in adult . . . . . 15.

3. Antennæ 9-jointed . . . . . 4.

Antennæ 8- (sometimes 7-) jointed . . . . . 6.

Antennæ not more than 7-jointed . . . . . 10.

4. Anal ring with 8 hairs . . . . . *Puto*, Sign.

Anal ring with 6 hairs . . . . . 5.

†Type *S. inflatipes*, Mask., Tr. N. Z. Inst., XXV., p. 238.

5. ♀ having the aspect of a *Dactylopius* . . . . . *Phenococcus*, Ckll.  
 ♀ covered with waxy lamellæ, like an *Orthezia* . . . . . *Ceroputo*, Sulc.
6. Insect with large projecting marginal tubercles . . . . . *Tylococcus*, Newst.  
 Without projecting marginal tubercles . . . . . 7.
7. Anal ring of ♀ with more than 8 hairs . . . . . *Lachnodius*, Mask.  
 Anal ring of ♀ with 6 hairs . . . . . 8.
8. ♂ with four caudal filaments . . . . . *Oudablis*, Sign.\*  
 ♂ (so far as known) with only two caudal filaments . . . . . 9.
9. Body very elongate; antennæ 8-jointed, shorter and stouter than in  
*Dactylopius*; eyes present; mentum short. . . . . *Pergandiella*, Ckll.  
 (*Westwoodia*, Sign.)  
 Body oval, usually with cottony tassel . . . . . *Dactylopius*, Costa.  
 Body subglobular, enclosed in a cottony sac . . . . . *Erium*, Crawford.  
 (Type *E. globosum*.)
10. Antennæ 6- or 7-jointed; when 7-jointed, distinguished from *Dactylo-*  
*pius* by the stouter legs and usually subterranean habitat . . . . . 11.  
 Antennæ 5-jointed; form elongate; anal tubercles promi-  
 nent . . . . . *Rhizacus*, Kunck.
11. ♂ apterous, with relatively short antennæ . . . . . *Fonscolombia*, Licht.  
 (*Pseudochermes*, Nitsche; *Apterococcus*, Newst.)  
 Not so . . . . . 12.
12. Legs extremely thick, like crab's claws . . . . . *Pseudoripersia*, Ckll.  
 Not so; legs ordinary . . . . . 13.
13. ♀ enclosed in a waxy sac . . . . . *Cryptoripersia*, Ckll.  
 Not so . . . . . 14.
14. "Antennæ very close together" (Tinsley) . . . . . *Ripersiella*, Tinsley.  
 (*R. rumicis* and *maritima*.) †  
 Antennæ normally placed . . . . . *Ripersia*, Sign.
15. Newly-hatched larva elongate, with 6-jointed antennæ . . . . . 16.  
 Newly-hatched larva oval or suboval . . . . . 17.
16. Terminal antennal segment of newly-hatched larva oval, little longer  
 than the one before. . . . . *Pseudolecanium*, Ckll.  
 Terminal antennal segment of newly-hatched larva very large, as  
 long as the three before . . . . . *Chatococcus*, Mask.

\*A genus of few species, found in Europe; when the male is unknown, the female is usually referred with safety to the large genus *Dactylopius* rather than to *Oudablis*.

†Prof. Tinsley has named this genus, and indicated its characters, in a thesis for the degree of B.S., presented to the N. M. Agricultural College, May 31, 1899. He will shortly prepare a paper describing the genus in detail.

17. Larva with 5-jointed antennæ; anal ring of adult with only 4 hairs.....*Cryptococcus*, Dougl.  
 Larva with 6-jointed antennæ, joint 6 long; anal ring of adult with 6 hairs. ....*Antonina*, Sign.  
 Larva with 7-jointed antennæ, sides very hairy; anal ring of adult and larva with 17 hairs.....*Kermicus*, Newst.

TACHARDIINÆ.

- Anal ring with numerous bristles.....*Tachardia*, Blanchard.  
 Anal rings without bristles; anus furnished with two membranous lobes, the edges of which are bristly.....*Gascardia*, Targ.

(To be continued.)

THE CLOVER-ROOT MEALY BUG.

*Dactylopius trifolii*, Forbes.

BY R. H. PETTIT, ASSIST. ENTOMOLOGIST AGR. COLLEGE, MICH.

On July 1, 1893, the writer collected a number of mealy bugs on clover (*Trifolium pratense*) at Ithaca, N. Y. They were found at about the level of the ground between the several stems of the plant, and also on the roots under the soil. On July 17 of this year the same insect was

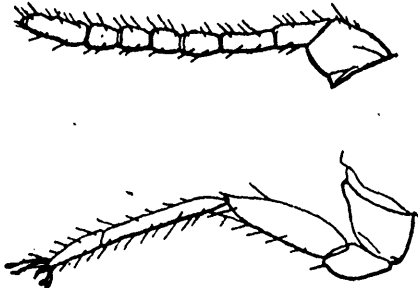


FIG. 34.—*DACTYLOPIUS TRIFOLII*.

found on the same plant at Agricultural College, Mich. As they were both supposed to be *D. trifolii*, Forbes, a comparison was made with the original description.\*

In this description the insect is credited with having seven joints to the antennæ, and as the adult females found here and at Ithaca have eight, the male pupa was examined. This form has seven joints, and

\* 14th Rep. of State Entomologist of Ill. for year 1884, by S. A. Forbes.



agrees perfectly with the description. The material left by Mr. G. C. Davis, on which he based his article on "Mealy Bugs and Their Allies"†, was examined and found to agree with both the description and the recently collected specimens. As no description of the adult female has as yet been found by the writer, it was thought that one might be of some interest.

The adult female measures a little more than two millimetres in length, is reddish-brown in colour, covered with a coating of waxy or mealy secretion. The legs are dirty yellow in colour. From the sides project from 15 to 17 (usually 17) waxy processes, forming a fringe around the body in the usual manner, with the shortest filaments near the head, and those near the tail considerably longer, sometimes one-third as long as the body. The antennæ are 8-jointed; joint 1 is swollen, as broad as long; 2 and 3 subequal, each about as long as 1; 4, 5, 6 and 7 subequal, a little over half as long as 2 or 3; 8 usually a little longer than 5 and 6 joined. There is considerable variation in 4, it is sometimes smaller than 5, 6 or 7, and sometimes slightly larger. The legs are dirty yellow, in length the tarsus is slightly more than half the tibia, which about equals the femur. Digitules 4; the 2 superior long and slender, the 2 inferior shorter and more stout. (The digitules were not distinct, but appeared as described.) Anal tubercles not very prominent, with a mass of small glandular spots, and bearing one long hair, with sometimes several smaller ones. Among the glandular spots are placed two conical projections or processes on each tubercle. These processes are from two to three times as long as broad at the base.

The figures of the antenna and leg (Fig. 34) are from drawings made from the Ithaca specimens in 1893.

### NEW COCCIDS FROM KANSAS.

BY PERCY J. PARROTT, MANHATTAN, KANSAS.

*Antonina Nortoni*, Parrott and Ckll.

Sac white, subglobular, cottonlike, completely enveloping female.

♀ oval, plump, cream-coloured, with slight tinge of brown on margin. Boiled in caustic potash, becomes transparent, with the exception of the antennæ, the two pairs of spiracles, and ultimate segment, including anal region, which are a dark yellowish-brown. There are many single glands, especially towards and about posterior segments;

† Insect Life, Vol. VII., 1894, p. 168.

they are less numerous anteriorly. On outer side of each spiracle there is a crescentic group of rather large circular glands, placed very close together. Antennæ aborted, short, thick, composed of three segments measuring respectively 18-25, 13-16, 27-28 mm. Mouth-parts large. Spiracles chitinous, large and extended. Anal orifice circular, situated in a depression, surrounded by a strong chitinous ring. Anal ring with six long, stout hairs measuring from 53 to 89 mm. in length. Around

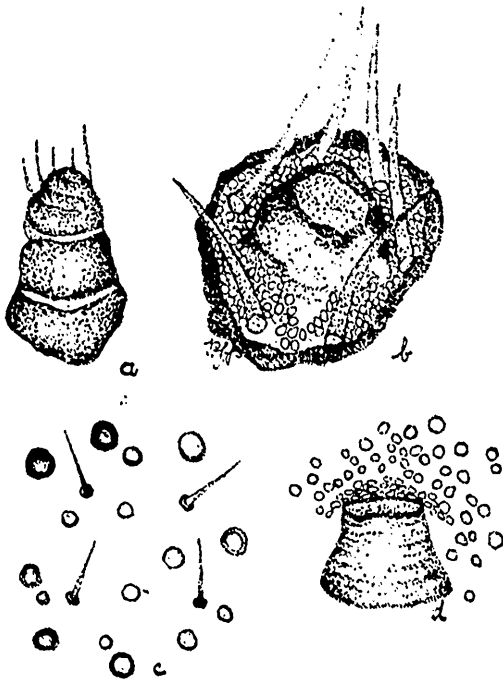


FIG. 35.—ANTONINA NORTONI.

the anal area are many slender hairs, very much smaller than the bristles of the anal ring.

In Fig. 35 *a* represents the antenna; *b*, anal ring; *c*, portion of derm about anal ring; *d*, spiracle.

This species was collected by Mr. J. B. Norton, on April 25th, 1899, at the bases of the stems of *Boutelona racemosa* on Blue Mont, Manhattan, Kans.

*Aspidiotus (Targionia) Marlatti*, sp. nov.

♀ scale 2 mm. in diameter, flat to slightly convex, dark reddish-brown, resembling walnut, on margin to a lighter shade at centre; exuviae lateral, large, black, often covered with brownish secretion; ventral pellicle thin, light reddish-brown, not easily separated from scale, and leaves no mark on host plant when detached.

♀ oval, white, with irregular spots of yellow; ultimate segment yellow, with the margin dark brown and strongly chitinous. Boiled in caustic potash, the female becomes transparent, with the exception of the lobes, which remain yellow. There are three pairs of lobes (Fig 36), which are short, broad, and quite widely separated, with the sides parallel; first pair either broadly rounded or truncate, and notched at distal end; second and third lobes similar, broader than mesal lobes, notched on

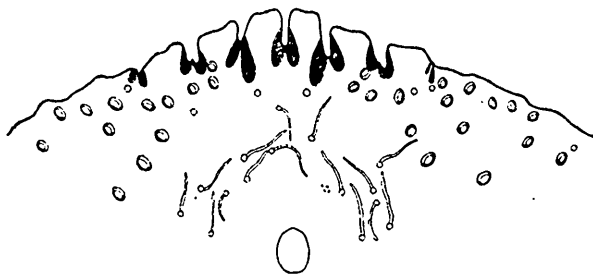
*Aspidiotus Marlatti*

FIG. 36.

margin, with that part lateral of the notch generally the larger. There is one small spine at the base of each of the mesal lobes, one larger one at the base of the lateral margin of each of the second and third lobes respectively, and another one on margin as distant from the third spine as the combined width of one mesal and one second lobe. Chitinous processes are of medium size, one pair to each incision; the ones lateral of mesal lobes are the largest. Plates are short and truncate, and apparently easily shed, as they do not appear in the boiled specimens; in the untreated specimens there are from one to two plates to each incision. There are no groups of circumgenital glands. The dorsal glands are large and fairly numerous. On each side and posterior of the anus there are a few tubular glands.

This interesting species was collected by Mr. J. B. Norton, who found it upon the base of the stems of grasses, *Andropogon furcatus* and *A. scoparius*, on Blue Mont, Manhattan, Kansas, and is named in honor of Mr. C. L. Marlatt, in recognition of his many valuable contributions to the knowledge of the Coccidæ.

## THE HABROPODA AND DIDASIA OF CALIFORNIA.

BY CARROLL FOWLER, BERKELEY, CAL.

The following is a list of the species of these two groups occurring in California, with notes on those forms known to me :

## HABROPODA, Smith.

A small group of bees, comparatively local in their habits, and in appearance very much like the larger species of Anthophora.

Legs with black pubescence. . . . . *floridana*.

Legs with pale pubescence.

Abdomen (except on first segment) with depressed, pale pubescence interspersed with erect, black hairs ; ♂ with scape yellow in front. . . . . *depressa*.

Abdomen without black hairs, pale pubescence erect ; ♂ with scape black. . . . . *miserabilis*.

1. *Habropoda floridana*, Smith.—Redonda, Cal. (H. O. Woodworth), May 23. One female.

2. *Habropoda depressa*, n. sp.

♀ 14 mm., ♂ 12–13 mm. Clothed with mixed black and pale pubescence, the latter depressed on the abdomen.

♀.—Head black, clothed with ashy pubescence, mixed with black on vertex, dense and white on cheeks and labrum, thin on clypeus, which is strongly punctured ; antennæ black. Thorax clothed with pale pubescence, thin on disc and strongly mixed with black above, dense white beneath ; wings subhyaline ; legs clothed with pale pubescence more or less tinged with yellow, very dense on posterior femora and tibiæ, brown on metatarsi beneath, a bunch of black pubescence at apex of posterior metatarsi ; claws reddish. Abdomen black, narrow apical margins of the segments brown ; first segment clothed with erect, white pubescence, except on apical margin, where it is black ; the remaining segments with appressed, yellow pubescence interspersed with erect black hairs. Ventral segments shining, fringed with long, pale pubescence.

♂.—Differs from ♀ in having narrow lines on the sides of the face, clypeus except narrow lateral margins, mandibles except tips, and scape in front yellowish-white ; legs with white pubescence, which is a little longer on the tibiæ and posterior tarsi behind, and quite long on the anterior and posterior femora ; venter thickly clothed with white pubescence.

*Habitat*: Berkeley, Cal., Feb. 22 to May 1; numerous specimens. Santa Catalina Island (H. O. Woodworth), June 21; one specimen. During the earlier part of the season several specimens were collected upon the white flowers of *Cytisus poliferus* in the botanic garden. About the middle of April quite a number of females were observed collecting pollen from oak blossoms. A few males were collected upon *Ranunculus californicus*. On April 22, 1899, several nests were examined. They are, in general, much like those of many other bees of solitary habits, being grouped together in quite large numbers, and each one consisting of a single burrow extending about a foot into the hard earth. The cell at the end is about 10 millimetres wide by 16 in length, lined with a thin, hard layer of wax and filled with a mixture of pollen and honey. A large number of the bees had taken possession of an old squirrel hole, from the inside of which, at a depth of about a foot, their burrows were found extending off in all directions, while the outside burrows extended nearly straight downward. The traces of a number of old burrows would indicate that the same spot had been visited from year to year. Only a few of the nests at this date were complete, and no larvæ were found.

3. *Habropoda miserabilis*, Cress., ♂.

♀.—Differs from male in being a little larger, having the face black, posterior legs clothed with long dense pubescence slightly tinged with yellowish, that on apical portion of the middle tibiæ above fuscous, at the tips of the posterior metatarsi a bunch of black hair. Both males and females have the pubescence on the under side of the legs more or less fuscous. The males before me have the "large sub-trefoil mark on the clypeus" extending somewhat on the region above.

San Francisco, Cal.; April. Twenty specimens, collected chiefly upon *Phacelia californica*.

DIDASIA, Patton.

The bees of this genus fly somewhat later in the season. None of the species are common in Berkeley, but *D. enavata* is very abundant in Southern California during the early part of summer.

Abdomen with black pubescence, except on segments 1-2; not banded ..... *neraea*.  
Abdomen with pale pubescence; white bands or fascia on apical margins of the segments.\*

\**D. alboresta*, Prov., seems to differ from *enavata* and *cinerea* chiefly in size, being only 8 mm. in length. The species is unknown to me.

Tarsi dark brown or black; ♂ with the third antennal joint slender, three times the length of the second.....*cinerea*.

Tarsi pale ferruginous; ♂ with third antennal joint not especially slender; about twice the length of the second.....*enavata*.

1. *Didasia nereia*, n. sp.

10.5 mm. Clothed with black pubescence, ochraceous on thorax and base of abdomen above.

♀.—Head black, finely punctured, clothed with long, dense, black pubescence, thinner on vertex and ochraceous on posterior part of occiput; antennæ entirely black. Thorax black, clothed with dense pubescence, yellowish above, black beneath; tegulæ black; wings hyaline, veins dark brown, second submarginal cell about half the length of the first, narrowed somewhat above; legs clothed with black pubescence, long and dense on posterior tibiæ and metatarsi. Abdomen black, with yellowish pubescence on the first two segments, somewhat mixed with black on the second, the remaining segments with rather short, black pubescence. Venter clothed with black pubescence.

♂.—Differs from female in having the pubescence, throughout, longer and more bushy, that on legs with a somewhat griseous appearance in certain lights; the posterior femora and tibiæ somewhat incrassate, their metatarsi slender and curved, and the apex with a subacute tooth, which is not especially prominent; apical segment of the abdomen bidentate.

*Habitat*: Tulare, Cal. (H. O. Woodworth); May. 10. Two specimens.

2. *Didasia alboresta*, Prov.—Los Angeles, Cal.

3. *Didasia cinerea*, n. sp.

♂ 13 mm. Clothed with cinereous pubescence, apical margins of the abdominal segments with white fascia.

♂.—Head black, punctured, clothed with griseous pubescence, slightly darker on vertex; apical margin of the clypeus nude; antennæ entirely black, third joint slender, broadening toward apex, three times the length of the second. Thorax black, finely punctured, clothed with rather dense, ashy pubescence, tinged with yellowish above; tegulæ dark brown to black, shining; wings hyaline, veins dark brown to black, second submarginal cell about half the length of the first, narrowed above; legs clothed with rather long, pale pubescence; the four posterior legs robust, the femora and tibiæ incrassate, the basal joint of the posterior tarsi

curved and having at apex beneath a prominent, curved, subacute tooth, which is flattened and dilated at base; tarsi brownish-black. Abdomen black, shining, clothed with erect, pale pubescence, longest at base and more or less mixed with black on segments 4-6; segments 2-6 with distinct, white, marginal fascia; apical segment bilobate. Venter clothed with white pubescence.

*Habitat*: Berkeley, Cal.; May and June. Three males. This species is closely allied to *D. australis*, which, however, has the second submarginal cell smaller and not narrowed above. It may readily be distinguished from the male of *D. enavata* by the longer third antennal joint, the much more prominent lobes of the apical segment of the abdomen, etc.

4. *Didasia enavata*, Cress. (= *D. tricincta*, Prov.)—Santa Catalina Island, Santa Barbara, and Redlands, Cal. (H. O. Woodworth); June. Numerous specimens.

#### DESCRIPTION OF THE LARVA OF HADENA MISELOIDES, GUEN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*Egg*.—A little less than spherical, the base flat. Twelve sharp ribs run to the vertex, which is large, circular, reticulate, with a central elevation at the micropyle; one-third of the way down these ribs neatly alternate with twelve others, forming twenty-four ribs around the base. Ribs straight; space distinctly, regularly cross striate. Diameter .8, height .7 mm.

*Stage I*.—Head rounded, mouth pointed; shining yellowish; width .5 mm. Body thickened at thorax and joint 12, robust, sharply tapering at joint 13, which is placed almost under joint 12. Translucent yellowish, shining and sticky like a slug, the food showing by transparency. Setæ minute and pale, not glandular, tubercles obsolete. Rests curled on the back of the leaf; several larvæ on the same leaf, but not gregarious. Hatched when found.

*Stage II*.—Head whitish, shining; width .7 mm. Body as before, but less yellowish, shining, but not sticky and green from the food. Joint 2 in front is yellowish, and the sides of joint 12 are whitish from the large tracheæ showing through the skin. Setæ nearly imperceptible.

*Stage III*.—Head small for the body, somewhat retracted, pale luteous; width 1.1 mm. Body robust, thorax and joint 12 enlarged, the latter somewhat angular, shining, translucent green, appearing all dark

green from the food ; three white dots on each segment on tubercles i. and ii, and a third not on a tubercle before ii., in line with it ; on thorax the dots are on i. a, i. b, and a dot before.

*Stage IV.*—As in the next stage, but without a dot before the spiracle ; width of head 2.0 mm.

*Stage V.*—Head testaceous green, small ; width 2.5 mm. Thorax no longer thickened, but joint 12 sharply humped, descending perpendicularly to the anal feet. Subtranslucent velvety green, frosted whitish subventrally, dorsal vessel darker green. A moderately broad, diffuse, rather faint white stigmatal line, faint at the ends. Tubercles i. and ii. and a dot before ii. distinct, pale yellow, with dark green rims ; iv. to vi. and a dot before spiracle white. Tubercle iv. is opposite the upper edge of the spiracle, except on joint 12, where it is below the lower edge. At the end of the stage the larva turned black, all the tubercles and dots yellow, and spun a rather firm cocoon on a piece of bark. Imago in thirty days.

This larva apparently omitted the normal fourth stage. In the last stage, also, the head is smaller than would be expected ; but the moth that emerged was a rather small male.

*Food plant.*—Cat briar (*Smilax rotundifolia*).

### CHLORIPPE CELTIS (BOISD.-LEC.) CAPTURED ON MONTREAL ISLAND.

BY CHARLES STEVENSON, MONTREAL.

On the 21st July, Mr. E. Denny, who often accompanies me on my entomological rambles, brought me a cyanide bottle full of butterflies which he had collected for amusement's sake. On looking at it I immediately saw a specimen that was new to me, and was congratulating myself on getting what I thought would be a new addition to the *Satyrinae* of my collection. My pleasure was increased, on consulting Dr. Holland's "Butterfly Book," to find it was a *Chlorippe celtis*, Boisd.-Lec., ♀, or Hackberry butterfly. (Plate XXIII., fig. 4.) A species, he states, as found generally from southern Pennsylvania, Ohio, Indiana, and Illinois, to the Gulf of Mexico. I immediately called my friend's attention to the specimen, and he remembered the particular place he had found it, because he thought at the time it was something he had not seen in my collection. So ever since we have watched the locality, but have not been successful in obtaining another. It was caught in the Outremont



district, just outside the city limits of Montreal. The only explanation I can find for its appearance is that it may have been imported in the chrysalid stage among some plants by some florist, as there are several nurseries in the neighborhood. The prevailing winds at the time would not favour migration.

### A NEW NOCTUID OF THE GENUS CIRROPHANUS.

BY T. D. A. COCKERELL, N. M. AGR. COLLEGE.

*Cirrophanus Dyari*, n. sp.—♀. Expanse 34 millim. General colour and markings just as in *C. triangulifer*, Grote, except as regards the following particulars: The general colour is more ochreous—not so orange; the t. p. line curves inwards to a point not far from the middle of the wing, whence it rapidly bends outwards for a short distance, after which it again bends downwards and inwards to the inferior margin; the s. t. line is further from the margin, and deeply shaded about the middle with ochreous; the oblique dark line from the lower part of the t. p. line to the costa is distinct, and has a sharp zigzag near its middle. It results from the direction of the t. p. line that the light patch at the anal angle is more extensive than in *C. triangulifer*, but it is broken by a dark shade representing the lower part of the s. t. line. Hind wings strongly suffused with gray, with a curved gray line crossing the middle. Thoracic tufts deep brownish-orange. On the under side the primaries, except their margins, are strongly shaded with blackish.

Fore tibiæ with a spine. Frontal tubercle well developed, with a semilunar hollow above it, surrounded by a strong rim.

*Hab.*—Fillmore Canon, Organ Mts., New Mexico, Aug. 28 (Ckll.). This was recognized as a distinct species by Dr. H. G. Dyar, but though I urged him to describe it, he would not. It is very different from *C. duplicatus*, Smith, but closely allied to *C. triangulifer*, from which it differs at once in the position of the notch in the t. p. line. The females of *triangulifer* in the National Museum have the hind wings without any dusky shade or lines; but Grote (Ill. Essay) figures a specimen with dusky hind wings, but with the s. t. line much nearer the margin than in *Dyari*.

The frontal tubercle of *Dyari* is perhaps a little less prominent than in *triangulifer*, but there is no noteworthy difference. The ♂ of *triangulifer* has the frontal tubercle much more produced and the hind wings less rounded than the ♀.

The type of *Dyari* is in the U. S. National Museum.

## LIFE HISTORY OF HYPBOROPHA HORMOS, HÜBN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

*H. hormos* is not uncommon on the persimmon in Alexandria County, Virginia. The species is double-brooded.

*Egg*.—Less than hemispherical, domed; ribbed with about 48 ribs around the margin, rather low, distinct, diminishing by confluence in pairs toward vertex, very slightly waved. Cross striæ faint lines crossing the hollows, scarcely indicated on the ribs. Micropyle somewhat broadly finely rounded reticular, not ridged. Diameter .6 mm.

*Stage I*.—Head rounded, slightly bilobed, colourless, ocelli black; width about .4 mm. Body slender, colourless transparent, food green; feet on joints 7 and 8 rudimentary, not used, larva a semi-looper. Shields scarcely cornified, faintly brown; tubercles distinct, pale, dark bordered; setæ short, stiff, white, i. and ii. in a square. Segments moniliform, incisures well marked, the segments not very strongly 3-annulate. Setæ primary.

*Stage II*.—Head small, slightly bilobed, whitish, dull; width .6 mm. Body slender, translucent green, food dark green; feet normal, small on joints 7 and 8, but little smaller than those on joints 9 and 10; anal feet projecting backward. No marks; tubercles obscure, setæ minute, i. and ii. faintly whitish.

*Stage III*.—The same; no perceptible marks; width of head .9 mm.

*Stage IV*.—Head 1.3 mm. Tubercles i. and ii. and the segmental folds distinctly whitish; no other marks as yet. Another example came out brown spotted at this stage. On the head, a dot on the vertex and at tubercle i.; a dash on each side of the cervical shield; an addorsal blotch on joint 4, and a dot on joint 3; a spot below tubercle i. on joints 5, 6, 7, 8, 10, 11 and 13; a large patch across dorsum on joints 9 and 12 anteriorly; some small dots on the sides and on joint 13 posteriorly.

*Stage V*.—Head as high as joint 2, scarcely bilobed, pale green, not shining, antennæ and mouth whitish; ocelli pale, in part black; width 1.8 mm. Body a little flattened, feet small, those of joints 7 and 8 slenderer than the others, those of joint 13 projecting backward. Translucent green, incisures folded, whitish, tubercles i. and ii. and the faintest trace of a subdorsal line in a few scattered dots yellowish-white; tubercles iii., iv. and v. and a few dots about the tracheal line also slightly pigmented. Ramifications of trachææ visible. Tubercle iv. of joint 5 at the upper corner of spiracle, of joints 6 to 9 at the lower corner, of 10 below the middle, of 11 nearly in line with tubercle v., of 12 at the middle.

*Stage VI.*—Head 2.2 mm. Much as before, but more opaque, the skin whitish-green, the dorsal vessel dark and plainly pulsating. Marks as before, the skin finely peppered with white granules; spiracles reddish. Feet about equal, all with broad claspers, but short.

The brown-spotted form occurs also in this stage and in stage V.

*Cocoon* a small, compact, fairly tough web covered with bits of leaves, bark or other material.

*Pupa.*—Light brown, smooth, slightly shining; no cremaster, the anal segment slightly bulging and with two short spines above and eight below in a transverse row. The spines resemble setæ and arise from small tubercles. Surface slightly shagreened, no punctures. A series of fine wavy lines about the first three spiracles. Length 12 mm.; width 3.5 mm.

## THE DIPHYLISM OF THE DIURNAL LEPIDOPTERA.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Having brought my studies of the neuration of the diurnals to a preliminary close, I wish to place on record here the conclusions to which they have led. The diphylism is founded on the following characters:

- A.—Butterflies having a short third anal vein on fore wings, curving downwardly from base to internal margin, and with only one anal vein on hind wings.....*Papilionides*.
- B.—Butterflies having a fork to the second anal vein of fore wings at base, sometimes incomplete, often disappearing through absorption, and with at least two anal veins on hind wings.....*Hesperiades*.

The nomenclature of the veins is unsettled. The submedian fold, usually obsolete, is numbered by Comstock, VI.; this would be the first anal vein. Comstock's vein VII. would be the second anal vein, and the curved and shortened vein which follows in the *Papilionides* would be the third. This vein is replaced in the *Hesperiades* by a short vein anastomosing above with the second anal vein (VII.), thus running in an opposite direction to the third anal of the *Papilionides*. This points to a different origin for the two groups. The fork of the *Hesperiades* has faded out in the *Satyrids* and most *Nymphalids*. It is persistent in the other families, with few exceptions in certain genera, *e. g.*, *Leucophasia*.

The rejection of Mr. Scudder's classification of the diurnals is based on the following grounds: The sequence in specialization of the anal

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

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

## CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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

(Paper No. 5.)

### FAMILY XX.—Philanthidæ.

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

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

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

Table of Subfamilies.

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

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

SUBFAMILY I.—Cercerinae.

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

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

Table of Genera.

- Second cubital cell petiolate .....3.
- Second cubital cell *not* petiolate.....2.
- 2. Dorsal abdominal segments 2-4 with a median transverse furrow or impression.
  - Third cubital cell quadrate, the third transverse cubitus uniting with the marginal cell at apex; lateral carinae of the pygidium terminating in a tooth. ♂.....Eucerceris, Cresson.
  - Third cubital cell not quadrate, the third transverse cubitus oblique, uniting with the marginal cell much before its apex; lateral carinae of the pygidium in ♂ *not* terminating in a tooth.....Nectanebus, Spinola.
- 3. Third cubital cell quadrate, the third transverse cubitus joining the marginal cell at apex; dorsal abdominal segments 2-6 with a median transverse furrow or impression. ♀...Eucerceris, Cresson.
- Third cubital cell not quadrate, the third transverse cubitus oblique, joining the marginal cell much before the apex; dorsal abdominal segments 2-6 without a median transverse furrow or impression, but usually margined at apex.

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

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

SUBFAMILY II.—Philanthidae.  $\left\{ \begin{array}{l} \text{h} \\ \text{h} \end{array} \right.$

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

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

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

Table of Genera.

- Eyes not at all emarginate within ; marginal cell at apex more or less distant from the costal margin, or subtruncate, *with* a slight appendage. . . . . 2.
- Eyes with a more or less distinct emargination within ; marginal cell at apex attaining the costal margin, *without* an appendage. . . . . 4.
- 2. Front wings with the second discoidal cell less than twice as long as wide at apex, the median and submedian cells equal or nearly . . . 3.
- Front wings with the second discoidal cell fully twice as long as wide at apex, or even longer.
  - Third cubital cell, along the cubitus, about twice as long as along the radius ; pygidium in ♀ quadrangular, concave above, the clypeus margined anteriorly, but not dentate ; ♂ *with* the pygidium triangular, the clypeus anteriorly 3-dentate. . . . . *Clypeodon*, Patton.
  - Third cubital cell, along the cubitus, usually more than twice as long as along the radius, sometimes thrice as long ; pygidium in ♀ triangular, *not* concave above, either flat or subconvex, the clypeus 3 to 5 dentate ; ♂ with the pygidium most frequently semicircular, or rarely obtusely triangular. . . . . *Aphilanthops*, Patton.

3. Cubitus in hind wings interstitial with the transverse median nervure ; marginal cell in front wings short, scarcely as long as the stigma, the second cubital cell triangular . . . . . Eremiasphecium, Kohl.
- Cubitus in hind wings originating before the transverse median nervure ; marginal cell in front wings not short, the second cubital cell trapezoidal . . . . . Philoponus, Kohl.
4. Abdomen *longly* petiolate, the petiole nearly of a uniform thickness throughout ; eyes deeply emarginate within . . . . . 7.
- Abdomen *not* petiolate, sessile.
- Eyes deeply emarginate within ; cubitus in hind wings variable, most frequently interstitial, or nearly, with the transverse median nervure ; abdomen smooth, polished, or at most sparsely or microscopically punctate . . . . . 6.
- Eyes with only a slight indication of an emargination, or at least never deeply emarginate within ; cubitus in hind wings most frequently originating a little before the transverse median nervure ; abdomen distinctly punctate, often strongly rugoso-punctate . . . . . 5.
5. Submedian cell in front wings fully as long as the median ; third cubital cell, along the radius, not longer than the second ; abdomen finely, closely, uniformly punctured, the segments, except the first, not constricted at the sutures . . . . . Epiphilanthus, Ashm., n. g.  
(Type *P. solivagus*, Say.)
- Submedian cell in front wings a little shorter than the median ; third cubital cell, along the radius, longer than the second ; abdomen usually strongly, coarsely and irregularly punctured, the segments mostly distinctly constricted at the sutures.
- Clypeus margined anteriorly, with a pencil of long hairs on each lateral angle ; first recurrent nervure received by the second cubital cell before the middle ; first transverse cubitus strongly angulated at basal third ; ♂ with the last joint of the antennæ much compressed, broadened . . . Pseudanthophilus, Ashm., n. g.  
(Type *P. ventilabris*, Fabr.)
- Clypeus not margined anteriorly, and usually, but not always, without the pencil of long hairs laterally ; first recurrent nervure received by the second cubital cell at or near the middle ; first transverse cubitus straight or slightly sinuate, but rarely distinctly angulated ; ♂ with the last joint of antennæ normal, not compressed . . . . . Anthophilus, Dahlb.  
(Type *P. politus*, Say.)

6. Labrum deeply emarginate, bidentate; mandibles simple; antennæ short, the flagellum stout, joints 2-4 wider than long; anterior tarsi in ♀ with a long flexible comb; abdomen smooth, or at most finely microscopically punctate, the segments narrowly depressed at apex. . . . . Philanthus, Fabr.
7. Head large, wider than the thorax, the eyes deeply emarginate within; metanotum with a distinct, triangular, smooth area at base, but with a median sulcus. . . . . Trachypus, Klug.  
= Simplephilus, Dahlb.  
= Philanthocephalus, Cam.

## North American Species.

- Subfamily I.—*Cercerinae*.  
*C. compacta*, Cr., ♀ ♂.  
 EUCERCERIS, Cresson.  
*C. compar*, Cr., ♀ ♂.  
*E. laticeps*, Cr. *C. dentifrons*, Cr., ♀.  
*E. flavocinctus*, Cr. *C. Dufourii*, Guér., ♂.  
*E. flavipes*, Cr. *C. elegans*, Smith, ♂.  
*E. zonatus*, Say. *C. fasciola*, Cr., ♂.  
*E. rubripes*, Cr. *C. finitima*, Cr., ♀.  
*E. unicornis*, Patt. *C. firma*, Cr., ♀.  
*E. elegans*, Cr. *C. frontata*, Say.  
*E. vittatifrons*, Cr. *C. fulvipes*, Cr., ♀.  
 var. *tricolor*, Ckll. *C. fumipennis*, Say., ♀ ♂.  
*E. superbus*, Cr. *C. gnara*, Cr., ♂.  
*E. similis*, Cr. *C. imitator*, Cr., ♀.  
*E. fulviceps*, Cr. *C. insolita*, Cr., ♂.  
*E. montanus*, Cr. *C. jucunda*, Cr., ♂.  
*E. insignis*, Prov. *C. Kennicottii*, Cr., ♂.  
*E. bicolor*, Cr. *C. mandibularis*, Patt.  
*E. canaliculatus*, Cr. *C. mimica*, Cr., ♀ ♂.  
*E. cerceriformis*, Cr., ♀. *C. morata*, Cr., ♀.  
 NECTANEBUS, Spinola. *C. nigrescens*, Smith.  
 CERCERIS, Latreille. *C. occipitomaculata*, Pack., ♂.  
*C. bicornis*, Guer., ♀. *C. rufinoda*, Cr., ♂.  
*C. biungulatus*, Cr. *C. rufopicta*, Smith, ♂.  
*C. Blakei*, Cr., ♀. *C. sexta*, Say, ♂.  
*C. californica*, Cr., ♂. *C. uncinata*, Taschb.  
*C. clypeata*, Dahlb. *C. venator*, Cr., ♂.  
 ?=*bicornis*, Guér.



- C. verticalis*, Smith, ♀.  
*C. vicina*, Cr., ♀.  
*C. Robertsonii*, Fox.  
*C. austrina*, Fox.  
*C. acanthophilus*, Ckll.  
*C. aequalis*, Prov.  
*C. simulans*, Sauss., ♂.  
*C. Montezuma*, Cam., ♀.  
*C. tolteca*, Sauss., ♀ ♂.  
*C. strigosa*, Cam., ♀.  
*C. Maximiliani*, Sauss., ♀.  
*C. aureofascialis*, Cam.  
*C. geniculata*, Cam., ♀.  
*C. feralis*, Cam., ♂.  
*C. Chiriquensis*, Cam., ♀.  
*C. flavomaculata*, Cam., ♀.  
*C. otomia*, Sauss., ♀ ♂.  
*C. flavida*, Cam., ♀ ♂.  
*C. marginata*, Cam., ♀.  
*C. mexicana*, Sauss., ♀ ♂.  
*C. haustecæ*, Sauss., ♀.  
*C. semipetiolata*, Sauss., ♀ ♂.  
*C. zapotica*, Sauss., ♂.  
*C. obsoleta*, Cam., ♀.  
*C. montivaga*, Cam., ♀.  
*C. Smithiana*, Cam., ♀.  
*C. subpetiolata*, Sauss., ♀.  
*C. truncata*, Cam., ♀ ♂.  
*C. imperialis*, Sauss.  
*C. exsecta*, Smith.  
*C. Esau*, Schlett.  
*C. acolhua*, Sauss., ♂.  
*C. curvicornis*, Cam., ♂.  
*C. hebes*, Cam., ♂.  
*C. azteca*, Sauss., ♀.  
*C. tepaneca*, Sauss., ♂.  
*C. erythropoda*, Cam., ♀.  
*C. rostrata*, Smith.  
*C. bothriophora*, Schlett.  
*C. chrysogastra*, Schlett.  
*C. trichiosoma*, Cam., ♂.  
*C. pilosa*, Cam., ♂.  
*C. scapularis*, Schlett.  
*C. thermophila*, Schlett.  
*C. graphica*, Smith, ♀.  
*C. sonorensis*, Cam., ♂.  
**DIDESMUS**, Dahlbom.  
*D. binodis*, Spin., ♀ ♂.  
 Subfamily II.—*Philanthina*  
**CLYPEODON**, Patton.  
*C. quadrinotatus*, Ashm., ♀.  
*C. concinnulus*, Ckll.  
*C. anglesius*, Ashm.  
**APHILANTHOPS**, Patton  
*A. Elsiæ*, Dunn.  
*A. frigidus*, Smith.  
*A. subfrigidus*, Dunn.  
*A. taurulus*, Ckll.  
*A. Coquilletti*, Ashm.  
*A. hispidus*, Fox.  
*A. Utahensis*, Bak.  
*A. laticinctus*, Cr.  
*A. Bakeri*, Dunn.  
*A. Foxii*, Ashm.  
*A. nevadensis*, Cr. (*Philanthus*).  
*A. marginipennis*, Cam., ♂.  
*A. punctifrons*, Cam., ♀.  
**EREMIASPHECIUM**, Kohl.  
**PHILOPONUS**, Kohl,  
**EPIPHILANTHUS**, Ashmead.  
 (1) *E. solivagus*, Say.  
 (2) *E. Sandbornii*, Cr.  
**PSEUDANTHOPHILUS**, Ashmead.  
 (1) *P. ventralis*, Fabr.

? <i>P. frontalis</i> , Cr.	<i>A. scelestus</i> , Cr.
? <i>P. xanthostigma</i> , Cam., ♀.	<i>A. dubius</i> , Cr.
? <i>P. maculifrons</i> , Cam., ♂.	<i>A. sublimis</i> , Cr.
? <i>P. multimaculata</i> , Cam., ♂.	PHILANTHUS, Fabricius.
ANTHOPHILUS, Dahlbom.	<i>P. bilunatus</i> , Cr.
<i>A. politus</i> , Say.	TRACHYPUS, Klug.
<i>A. albifrons</i> , Cr.	<i>T. mexicanus</i> , Sauss.
<i>A. flavifrons</i> , Cr.	<i>T. punctifrons</i> , Cam., ♂.
<i>A. pacificus</i> , Cr.	<i>T. hirticeps</i> , Cam., ♂.
<i>A. albopilosus</i> , Cr.	<i>T. gracilis</i> , Cam., ♂.

## FAMILY XXI.—Trypoxylidæ.

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

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

Only two genera are known, separable as follows :

## Table of Genera.

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

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

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

## North American Species.

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

## FAMILY XXII.—Mellinidæ.

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

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

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

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

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

Table of Genera.

- Cubitus in hind wings originating *beyond* the transverse median nervure . . . . . 5.
- Cubitus in hind wings *interstitial* with the transverse median nervure . . . . . 4.
- Cubitus in hind wings originating *before* the transverse median nervure.
- Front wings with the second cubital cell receiving both recurrent nervures . . . . . 2.
- Front wings with the first and third cubital cells each receiving a recurrent nervure; submedian cell a little shorter than the median . . . . . Mellinus, Fabr.
2. Submedian cell a little longer than the median . . . . . 3.
- Submedian and median cells equal, the transverse median nervure *interstitial* with the basal nervure, stigma not well developed, the radius originating from its apex . . . . . Harpactostigma, Ashm., n. g.  
    (Type *H. velutinus*, Spin.)
3. Stigma well developed, rounded off at apex, the radius originating before its apex or near the middle, eyes very large, strongly convergent anteriorly on the clypeus.
- First recurrent nervure received by the second cubital cell at its middle; abdomen with the dorsal segments depressed at apex . . . . . Entomosericus, Dahlb.
- First recurrent nervure received by the second cubital cell before the middle; abdomen with the dorsal segments not depressed at apex, normal . . . . . Megalomma, Smith.
4. Stigma only moderately developed, the radius originating from its apex; submedian cell a little longer than the median; second cubital cell receiving both recurrent nervures; triangular area of metathorax well defined, striated; scutellum with a crenulate furrow across the base . . . . . Hypomellinus, Ashm., n. g.  
    (Type *G. rufocinctus*, Fox.)

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

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

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

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

Head with the eyes not convergent on the clypeus, but convergent posteriorly; abdomen not or scarcely longer than the head and thorax united, the first segment strongly coarctate, dorsal segments *without* white pubescent bands at

apex. . . . . Mellinogastra, Ashm., n. g.

(Type *G. mellinoides*, Fox.)

Head with the eyes convergent on the clypeus, divergent posteriorly; abdomen longer than the head and thorax united, the first segment long, petioliform, subcoarctate, the dorsal segments banded with a whitish pubescence at

apex. . . . . Hapalomellinus, Ashm., n. g.

(Type *G. eximius*, Prov.)

#### North American Species.

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|---|--|
| (1) MELLINUS, Fabr.                     | (1) <i>H. rufocinctus</i> , Fox, ♀.    |
| (1) <i>M. abdominalis</i> , Cr., ♀ ♂.   | (2) (?) <i>H. piceus</i> , Hdl., ♂.    |
| (2) <i>M. bimaculatus</i> , Pack., ♀ ♂. | (6) EUSPONGUS, Lepeletier.             |
| (3) <i>M. rufinodus</i> , Cr., ♀ ♂.     | (1) <i>E. bipunctatus</i> , Say., ♀ ♂. |
| (4) <i>M. pygmaeus</i> , Handl., ♀ ♂.   | (2) <i>E. Championi</i> , Cam., ♀.     |
| (5) <i>M. alpestris</i> , Cam., ♀.      | (7) OLGIA, Radoszkowski.               |
| (6) <i>M. obscurus</i> , Hdl., ♀.       | (8) MELLINOASTRA, Ashmead.             |
| (2) HARPACTOSTIGMA, Ashmead.            | (1) <i>M. mellinoides</i> , Fox, ♀.    |
| (3) ENTOMOSERICUS, Dahlbom.             | (9) HAPALOMELLINUS, Ashmead.           |
| (4) MEGALONMA, Smith.                   | (1) <i>H. eximius</i> , Prov., ♀ ♂.    |
| (5) HYPOMELLINUS, Ashmead.              |  |

## A NEW SPECIES OF TINGITIDÆ.

BY OTTO HEIDEMANN, U. S. DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Among the interesting species of Heteroptera which have been sent to the Division of Entomology by correspondents during the present season was a species of Tingitidæ which has not hitherto been described. In accordance with an established custom of the U. S. Department of Agriculture, the following description is submitted for publication in a periodical journal in preference to publishing it in a Departmental bulletin.

*Gargaphia angulata*, n. sp.

Oblong, narrower than other species of the genus *Gargaphia*, yellowish-white, translucent; body black beneath; posterior part of the rostral groove at the metasternum transverse. Head black, with three white, short but rather thick, obtuse spines in front between the antennæ. Antennæ slender, finely ciliated, testaceous, apical joint blackish; basal joint nearly twice as long as joint two; joint three very long, about four times as long as the apical. Pronotum dark, with three carinæ; the interspaces closely and finely punctate; the carinæ moderately foliaceous, testaceous, the median carina posteriorly whitish, tapering toward the apex of the reticulated membranous triangular portion of the pronotum; the membranous pronotal margin raised and moderately wide, angularly dilated behind the middle, with two rows of areoles at the narrow portion and with three areoles at the widest part, the areoles infuscated; pronotal hood small, oblong, somewhat compressed, with a sharp carina at the top, slightly projecting in front, leaving the eyes free; the hood, the three carinæ and the edge of the pronotal margin densely fringed with long, soft hairs. Hemelytra extending far beyond the abdomen, oblong-oval, broadly rounded at the apex, the sides abruptly converging to the base; subcostal and discoidal areas closely reticulated, the subcostal biseriate, the discoidal area comparatively narrow and not reaching the middle of the hemelytra, with three series of areoles at the widest part; the costal area rather broad, the areoles of irregular size, more or less hexagonal, except those along the exterior margin, which are either pentagonal or quadrate; the sutural area, but not the inner basal portion of it, has a few quite large areoles; three or four oblique blackish nervures at the costal area, and also some slightly darkened nervures at the apex of the hemelytra. Legs testaceous, with the tarsi blackish at the tip. On the rounded oval external genital plate of the male there is on both sides near the base a deep sunken point, the claspers at the apex are stout and hairy. Length, 3.4; width, 1.6 millim.

Described from several specimens found at Auburn, Ala., and District of Columbia (Heidemann). Type, No. 4371, U. S. Nat. Museum, from Auburn, Ala. A single specimen, probably from Missouri, and preserved in the collection of the U. S. Nat. Museum, is labeled in Prof. Uhler's handwriting: "Tingis angulata, Uhler, MS., on beans, Riley." I gladly accept Prof. Uhler's manuscript name.

This species is closely allied to *G. viridescens*, Champ., from Mexico and Texas, but differs by the angulated sides of the pronotum, by the larger number of areoles at the costal area, and the longer hairs at the edge of the pronotal margins and of the hood. It is also allied to *G. nigrinervis*, Stal., from Colombia and Mexico, but does not have the discoidal area of the hemelytra abruptly closed behind by a transverse oblique raised nervure.

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#### BOOK NOTICES.

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INSECTS: THEIR STRUCTURE AND LIFE—A Primer of Entomology.—By George H. Carpenter. London: J. M. Dent & Co. New York: The Macmillan Co., 66 Fifth Avenue. (Price, \$1.75.) 404 pages.

This is a very satisfactory manual for the elementary study of entomology, and provides the student with all that he needs at first to know regarding the structure and general life-history of insects. The book is almost entirely a compilation from a large number of more elaborate and highly technical works, such as Dr. Packard's recent Text-book, Professors Miall & Denny's monograph on the Cockroach, and many others, but it is admirably put together and written in an easy and agreeable style. Its careful perusal will give the reader an excellent ground work for the pursuit of entomology, whether he proposes to apply himself to economic investigation or systematic study, or simply to the formation of a collection of insects. The book is divided into half a dozen chapters, the titles of which will give a good general idea of its contents, viz.: The Form of Insects, the Life-history, the Classification, the Orders, the Pedigree of Insects and their Surroundings. The illustrations, nearly two hundred in number, are very largely those with which we are familiar, the work of Dr. Riley and members of the staff of the Division of Entomology at Washington; others are from Miall & Denny's "Cockroach," and several English publications. They are a great help in elucidating the text, being well chosen for their clearness and excellence. The book may

very well be studied by college students and others taking a course in entomology; it will be found much simpler and easier to work through than Dr. Packard's larger and more elaborate treatise, but it will not be found of any use in the classification and identification of specimens, like Prof. Comstock's Manual, as this is not its object. Throughout the whole, it may be mentioned, the reader will observe its author's evidently strong views on the theory of evolution.

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#### NEW SPECIES OF LEPIDOPTERA.

Mr. Herman Strecker has recently published the second part of the Supplement to his "Lepidoptera: Rhopaloceres and Heteroceres, indigenous and exotic." It contains descriptions of three new species of butterflies and fifty moths; the former and a few of the moths are from regions outside the faunal limits of the United States and Canada. Two species are distinctively Canadian: *Therina fatuaria* from Montreal and *Ochyria Anticostiata* from the island of Anticosti. These Supplements will be quite as necessary to the student of Lepidoptera as the original work. They may be obtained from the author, P. O. Box 311, Reading, Penna. (Price, 25 cents each.)

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FLASHLIGHTS ON NATURE.—By Grant Allen; illustrated by Frederick Enock. Toronto: William Briggs, 29 Richmond Street West. (Price, 70 cents.) 312 pages.

Mr. Grant Allen's versatility as a writer is well known, but whatever opinion may be formed regarding his novels and tales of fiction, there can be no question that few authors can be compared with him when he devotes himself to natural-history subjects. His papers show that he must be a most minute and painstaking student of the wonders of plant and animal life, while at the same time his literary skill enables him to describe what he has seen and studied in a most charming manner and without any loss of scientific precision. He has also the able assistance of Mr. Enock, who is a well-known entomologist, and who evidently aids the author not only with his beautiful drawings, but with his careful observations as well. Most, if not all, of the papers in the volume before us have already appeared in the pages of a widely-circulated magazine, but they are well worthy of reproduction in this more permanent and convenient form. They treat of insects, birds, and plants, under such titles as the Cows that Ants Milk, a Plant that Melts Ice, a Beast of Prey



(Spider), a Woodland Tragedy (doings of a Butcher bird), Marriage Among the Clovers, the First Papermaker, etc. The closing paper, a Foreign Invasion of England, gives an admirable description of the life-history of the Hessian Fly. The illustrations, about a hundred and fifty in number, are very beautiful, and in clearness and excellence leave nothing to be desired. Anyone with a genuine love of nature cannot fail to be delighted with the book, and to derive from its perusal a knowledge of many things that were secrets to him before.

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### CORRESPONDENCE.

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#### DERMESTES LARDARIUS (LINN.) IN HONEYCOMB.

In Dr. Lintner's Sixth Report of the Injurious Insects of the State of New York, 1890, mention is made of the fact that *Dermestes lardarius* was a wax-feeder. The only other reference to this habit of the insect was made by Dr. C. V. Riley, in the second volume of the American Entomologist for 1870.

A few days ago, while Mr. Ross, Fellow in the Bacteriological Department, was overhauling some brood comb which had been sent him for studying *foul brood*, he came across several adult beetles, many hairy larvæ, and moult skins, which he referred to me for identification. They all belonged to *Dermestes lardarius*. There is not good evidence, however, that they were feeding upon wax; but rather upon the dead larvæ and pupæ of Bee Moths (*Galleria mellonella*) which had established themselves in the honeycomb. On opening several cocoons of the Bee Moth, I found that the larvæ of *Dermestes* had possession of the old pupa-cases. The cocoons were all placed at right-angles to the direction of the honeycomb cells. Many large larvæ of *Galleria* were still to be found, and their silk-lined tunnels in the honeycomb were quite in evidence. A third suggestion is that the larvæ of *Dermestes* may prey upon the larvæ of the bee. In this case, however, I am of the opinion that the dead pupæ and larvæ of the Bee Moth formed the chief portion of the food of *Dermestes*. W. LOCHHEAD, Biological Dept. Ont. Ag. Coll.

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JUSTUS W. FOLSOM, of Cambridge, Mass., received the degree of Doctor of Science from Harvard University at the last commencement. His thesis was based upon anatomical and embryological work among the Collembola and Thysanura.

P. H. ROLFS has accepted a position at Clemson College and Experiment Station, and has accordingly changed his address from Lake City, Florida, to Clemson College P. O., South Carolina.

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Mailed October 6th, 1899.