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CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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

(Paper No. 2.)

FAMILY XV.—Oxybelidæ.

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

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

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

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

Table of Genera.

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

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

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

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

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

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

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

The North American species will fall in the following genera:

- | | |
|---|--|
| (1) OXYBELOMORPHA, Brauns. | (16) <i>O. Cressorii</i> , Robt. |
| None. | (17) <i>O. heterolepis</i> , Ckll. et B. |
| (2) BELOMICRUS, Costa. | (18) <i>O. dejectus</i> , Ckll. et B. |
| (1) <i>B. Forbesii</i> , Robt. | (19) <i>O. acutus</i> , Bak. |
| (2) <i>B. cladothricis</i> , Ckll. | (20) <i>O. Robertsonii</i> , Bak. |
| (3) <i>B. argenteospilus</i> , Cam. | (21) <i>O. varicoloratus</i> , Bak. |
| (3) OXYBELUS, Latreille. | (22) <i>O. hirsutus</i> , Bak. |
| (1) <i>O. uniglumis</i> , Linn. | (4) NOTOGLOSSA, Dahlbom. |
| (2) <i>O. quadrinotatus</i> , Say. | (1) <i>N. mexicanus</i> , Robb. |
| (3) <i>O. similis</i> , Cress. | (2) <i>N. bugabensis</i> , Cam. |
| (4) <i>O. quadricolor</i> , Ckll. et B. | (3) <i>N. longispina</i> , Cam. |
| (5) <i>O. subulatus</i> , Robt. | (4) <i>N. azteca</i> , Cam. |
| (6) <i>O. cornutus</i> , Robt. | (5) <i>N. sparidens</i> , Ckll. |
| (7) <i>O. subcornutus</i> , Ckll. | (6) <i>N. Cockerellii</i> , Bak. |
| (8) <i>O. punctatus</i> , Baker. | (7) <i>N. trifidus</i> , Ckll. et B.* |
| (9) <i>O. rejectus</i> , Bak. | (8) <i>N. dilutus</i> , Bak. |
| (10) <i>O. striatus</i> , Bak. | (9) <i>N. intermedius</i> , Bak. |
| (11) <i>O. Packardii</i> , Robt. | (10) <i>N. emarginatus</i> , Say. |
| (12) <i>O. sericeus</i> , Robt. | (11) <i>N. coloradensis</i> , Bak. |
| (13) <i>O. laetus</i> , Say. | (12) <i>N. abdominalis</i> , Bak. |
| (14) <i>O. fulvipes</i> , Robb. | (13) <i>N. frontalis</i> , Robb. |
| (15) <i>O. niger</i> , Robb. | |

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

FAMILY XVI.—Crabronidæ.

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

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

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

Table of Subfamilies.

- Abdomen beneath *not* flat, either convex or subconvex and laterally rounded, not acute or carinate, the dorsal segments usually normal, rarely distinctly constricted at the sutures; second discoidal cell not much longer than the first, often shorter and not very narrow. 2.
- Abdomen sessile, beneath *very* flat, and laterally acute or carinate, the dorsal segments with a constriction at the sutures and margined at apex; transverse median nervure in front wings uniting with the median vein *far* before the origin of the basal nervure, the second discoidal cell, in consequence, being very long and narrow, much longer than the first discoidal cell; first recurrent nervure joining the first cubital cell at or near the middle; mesopleura sharply margined anteriorly and posteriorly, and the carina of same connected with a carina along the sides of the mesosternum; mandibles at apex edentate acute; maxillary palpi 6-, labial 4-jointed. Subfamily I., Anacrabroninæ.
2. Mandibles at apex simple, edentate; maxillary palpi 6-, labial palpi 4-jointed; first recurrent nervure received by the first cubital cell at or near the middle, never very far beyond the middle. Subfamily II., Lindeniinæ.
- Mandibles at apex 2- or 3-dentate, rarely truncate and indistinctly bidentate in a few females; never, however, acute, as in the *Anacrabroninæ* and the *Lindeniinæ*.

- Abdomen petiolate, or the first segment longly petioliform; the first segment always long and *without* a delicate carina laterally, or at least the lateral carinae are not sharply defined, much abbreviated, and never extend to the apex of the segment...4.
- Abdomen always sessile, never petiolate or with the first segment petioliform; the first segment never very long and always with distinct lateral carinae that extend clear to the apex of the segment; maxillary palpi 6-jointed, labial palpi 3- or 4-jointed; antennae in ♀ 12-, in ♂ 12- or 13-jointed..... 3.
3. *Mesopleura* *with* a distinct ridge, carina or crest before the middle coxae; recurrent nervure in front wings joining the cubitus always *far* beyond the middle of the first cubital cell, at about its apical fourth or fifth; antennae in both sexes 12-jointed, the flagellum in the ♂ not fringed with fine hairs beneath; ocelli, except very rarely, arranged in an obtuse triangle . . . , the lateral ocelli being about twice as wide from each other as to the front ocellus or nearly; mesonotum and usually also the mesopleura coarsely sculptured; metathorax more or less coarsely sculptured, opaque or subopaque, never smooth, the cordate area on the posterior face wanting or at most indistinctly defined..... Subfamily III., Crabroninae.
4. *Mesopleura* *without* a ridge, carina or crest before the middle coxae, at most, and rarely, with only a pointed tubercle; recurrent nervure joining the cubitus at or near the middle of the first cubital cell or somewhat beyond the middle, or at the most never beyond its apical third; antennae in ♀ 12-jointed, in ♂ 13-jointed, the flagellum in the latter usually fringed beneath with fine hairs; metathorax as a rule less coarsely sculptured than in the Crabroninae, often smooth, shining, the cordate area on the posterior face distinct or indistinctly defined, never entirely wanting..... Subfamily IV., Thyreopinæ.
3. Mandibles bidentate, rarely 3-dentate or bluntly truncate in ♀; maxillary palpi most frequently 5-jointed, rarely 6-jointed, the labial palpi 3- or 4-jointed; first recurrent nervure in front wings received by the first cubital cell at or near the middle, rarely much beyond the middle..... Subfamily V., Rhopalinae.

SUBFAMILY I.—Anacrabroninae.

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

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

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

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

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

[Type *A. ocellatus*, Pack]

North American Species.

(1) ANACRABRO, Packard.

(1) *A. ocellatus*, Pack.

(2) *A. boerhaviae*, Ckll.

SUBFAMILY II.—*Lindeniinae*.

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

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

Table of Genera.

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

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

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

[Type *E. brevis*, Lind.]

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

[Type *E. Braueri*, Kohl.]

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

[Type *L. argentatus*, Lep. et Br.]

North American Species.

- (2) ENTOMOGNATHUS, Dahlb.

(1) *E. texanus*, Cr.

- (3) ENCOPOGNATHUS, Kohl.

None.

- (4) LINDENIUS, Lepel. et Br.

(1) *L. errans*, Fox.

(2) *L. latifrons*, Fox.

(3) *L. armaticeps*, Fox.

(4) *L. flaviclypeus*, Fox.

(5) *L. pinguis*, Fox.

(6) *L. salicis*, Ckll. (*Ammoplanus*).

SUBFAMILY III.—Crabroninae.

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

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

Table of Genera.

Males: mandibles at apex always bidentate 10.

Females:

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

vated and without a well-defined pygidial area, the lateral carinae being never highly elevated; ocelli in an obtuse triangle 8.
Mandibles at apex tridentate; pygidium narrowed towards apex, subogival, and deeply channelled or excavated, with a well-defined narrowed pygidial area, the lateral carinae high; if triangular, which is rare, excavated.

Mandibles *without* a tooth within towards base 7.

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

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

Superorbital foveae sharply defined, long, linear or oblong.

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

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

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

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

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

- tooth or tubercle, so that the clypeus anteriorly appears tridentate..... Thyreus, Lepel. et Br.
- } Type *C. clypeatus*, Schb., ♀. }
- } *C. vexillatus*, ♂. }
4. Scrobes normal, *not* bounded by a transverse carina superiorly. 5.
 Scrobes deep, *bounded* by a transverse carina superiorly.
 Mesonotum rather coarsely confluent punctate, but without longitudinal aciculations, except sometimes slightly posteriorly and on the scutellum, the mesopleura at the most with some striae superiorly; metathorax at sides and posteriorly striated, the metanotal area coarsely reticulated or alveolate; third antennal joint longer than the fourth, scarcely twice as long as the pedicel, joints 4-5 about equal; abdomen shining, at the most sparsely microscopically punctate Ectemnius, Dahlb.
 [Type *C. guttatus*, Lind.]
5. Mesonotum *not* longitudinally striate or aciculate, either finely or coarsely punctate; clypeus more or less strongly produced medially at apex.....6.
 Mesonotum longitudinally striate or aciculate, as well as the scutellum, the mesopleura and the metathorax, the anterior part of the mesonotum especially laterally more or less transversely striate; clypeus not strongly produced medially, but with a median ridge or carina on its disk; third joint of antennæ long, about as long as joints 4-5 united; abdomen shining or subopaque, finely coriaceous, or microscopically punctate, the first segment highly polished..... Crabro, Fabr.
 [Type *C. fossorius*, Linne.]
6. Mesonotum on disk and posteriorly sparsely punctate, but anteriorly and at sides closely confluent punctate, subopaque; mesopleura neither strongly nor distinctly striate, except superiorly; metathorax with the basal area punctate, not striate, the posterior face rugulose, slightly striate at apex, the pleura smooth, delicately aciculated; clypeus similar to *Crabro*; third antennal joint not so elongate but longer than the fourth; abdomen finely coriaceous and microscopically punctate..... Hypocrabro, Ashm., n. g.
 [Type *C. r-raculatus*, Say.]
- Mesonotum closely confluent punctate, opaque or subopaque, the mesopleura and metathorax, including the basal area, strongly striate; clypeus similar to *Crabro*.

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

- Third antennal joint much shorter than joints 4-5 united.
Abdomen, or at least the basal segment, highly polished, impunctate, or at most sparsely microscopically punctate; pygidial area much narrowed, deeply excavate and fully twice as long as wide at base; first joint of flagellum twice as long as the pedicel *Xestocrabro*, Ashm., n. g.
[Type C. *6-maculatus*, Say.]

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

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

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

- 8. Mandibles with a tooth within near the middle or towards the base. Superorbital foveæ very distinct, sharply defined, elongate or linear, dull at bottom 9.
Superorbital foveæ wanting or at most indicated only by a slight, scarcely perceptible glabrous depression or streak; third antennal joint long, about as long as joints 4-5 united or a little longer:

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

[Type *C. rufifemur*, Pack.]

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

[Type *C. alatus*, Panz.]

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

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

[Type *sexcinctus*, H. Schf.]

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

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

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

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

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

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

[Type *S. interruptus*, Lep.]

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

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

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

[Type *C. subterraneus*, Fabr.]

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

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

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

[Type *C. clypeatus*, Sch.]

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

[Type *C. alatus*, Panz.]

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

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

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

length; front femora dilated at extreme base beneath with a slight tooth; middle tibiæ with a short apical spur..... Ectemnius, Dahlbom.

[Type E. guttatus, Dahlb.]

Scrobes normal, not bounded by a transverse carina superiorly.

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

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

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

[Type C. chrysarginus.]

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

Front tarsi normal, cylindrical; middle tibiæ with an apical spur; antennæ simple, none of the joints emarginate.....

Hypocrabro, Ashm., n. g.

[Type C. 10-maculatus, Say.]

Front trochanters normal, unarmed; metathorax not alveolate.

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

Front tarsi normal, not dilated.

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

Antennæ normal with the second joint much thickened, none of the flagellar joints emarginate beneath..... Metacrabro, Ashm., n. g.

[Type C. Kollari, Dahlb.]

Antennæ with the second joint normal, some of the flagellar joints emarginate beneath.....Xestocrabro, Ashm., n. g.

[Type C. 6-maculatus, Say.]

Middle tibiæ with an apical spur; antennæ with the sixth joint strongly emarginate beneath; abdomen sparsely but distinctly punctateXylocrabro, Ashm., n. g.

[Type C. stirpicola, Pack.]

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

[Type C. ruffifemur, Pack.]

17. Abdomen distinctly punctate, the pygidium without a median sulcus..... Thyreocerus, Costa.

[Type C. crassicornis, Costa.]

North American Species.

SUBFAMILY III.—Crabroninæ.

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|--|---------------------------------------|
| (5) SOLENIUS, Lepeletier. | <i>quadrangularis</i> , Pk. |
| (1) <i>S. cinctellus</i> , Fox, ♀. | <i>18-maculatus</i> , Pk. |
| (2) <i>S. interruptus</i> , Lepel., ♀. | (2) <i>C. trapezoideus</i> , Pack. |
| (3) <i>S. bellus</i> , Cr., ♀ ♂. | uncertain position. |
| (4) <i>S. producticollis</i> , Pack. | <i>C. saxatilis</i> , Cam. |
| (5) <i>S. rufipes</i> , Lep. | <i>C. Championi</i> , Cam. |
| = <i>excavatus</i> , Fox. | <i>C. antiplanæ</i> , Cam. |
| (6) <i>S. scaber</i> , Lepel. | <i>C. sonorensis</i> , Cam. |
| (7) <i>S. texanus</i> , Cr. | <i>C. montivagus</i> , Cam. |
| ? <i>S. ventralis</i> , Cam. | <i>C. centralis</i> , Cam. |
| (6) THYREUS, Lepel. | <i>C. ariel</i> , Cam. |
| (7) ECTEMNIUS, Dahlbom. | <i>C. vektor</i> , Cam. |
| <i>E. montanus</i> , Cr. | <i>C. costariensis</i> , Cam. |
| <i>E. atriceps</i> , Cr. | <i>C. guerrerensis</i> , Cam. |
| <i>E. brunneipes</i> , Pack. | <i>C. yucatenensis</i> , Cam. |
| <i>E. corrugatus</i> , Pack. | <i>C. montezuma</i> , Cam. |
| <i>E. parvulus</i> , Pack. | (9) HYPOCRABRO, Ashm. |
| <i>E. pauper</i> , Pack. | <i>H. decemmaculatus</i> , Say, ♀ ♂ |
| (8) CRABRO, Fabricius. | <i>H. Packardii</i> , Cr., ♀. |
| (1) <i>C. maculatus</i> , Fabr. | (10) PSEUDOCRABRO, Ashm. |
| <i>singularis</i> , Sm. | (1) <i>P. odyneroides</i> , Cr., ♀ ♂. |

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| (2) <i>P. imbutus</i> , Fox. | (2) <i>C. gracilissimus</i> , Pack. |
| (3) <i>P. chrysarginus</i> , Lepel. | (3) <i>C. nigrifrons</i> , Cr. |
| (11) XESTOCRABRO, Ashm. | = <i>septentrionalis</i> , Pack. |
| (1) <i>X. sexmaculatus</i> , Say. | (15) PROTOTHYREOPUS, Ashm. |
| (2) <i>X. trifasciatus</i> , Say. | (1) <i>P. dilectus</i> , Cr., ♀ ♂. |
| (3) <i>X. paucimaculatus</i> , Say. | (2) <i>P. bigeminus</i> , Patt., ♀ ♂. |
| (12) XYLOCRABRO, Ashm. | (3) <i>P. rufifemur</i> , Pack., ♀ ♂. |
| (1) <i>X. stirpicola</i> , Pack., ♀ ♂. | (4) <i>P. villosus</i> , Fox, ♀. |
| (13) METACRABRO, Ashm. | (16) CERATOCOLUS, Lepel. et Br. |
| (14) CLYTOCHRYSUS, Morawitz | (17) HYPOTHYREUS, Ashm. |
| (1) <i>C. obscurus</i> , Smith, ♀ ♂. | (18) THYREOCERUS, Costa. |

BOMBYX CUNEA AND SPILOSOMA CONGRUA.

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

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

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

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

the National Museum are from points north of New Jersey. The insect is with us decidedly rare, and only isolated specimens occur. I have never in any collection here seen the banded forms which Mr. Fyles describes, and the indications are all that the insect is rather boreal than otherwise, and would hardly be expected to extend south into Georgia, except possibly as a very rare species. It becomes extremely doubtful, therefore, whether, in a general collection such as that made by Mr. Milne, three banded specimens of *antigone*, so different in size, would be represented. On the other hand, *cunea* is common in the South, and the banded form is almost as frequent at some seasons as is the white. In all the specimens of *antigone* seen by me there is very little variation in size, and they are indeed remarkably uniform. I have six examples, ranging from New York to South Dakota, and between the extremes there is no difference of four lines, while the smallest specimen exceeds considerably the sixteen lines mentioned by Mr. Walker.

Of *cunea* I have a large series, part of them bred, part captured, and among them specimens that attain twenty lines in expanse. On the other hand, I have some that are only half that size. Nearly all the Northern specimens run small; the Southern specimens, on the other hand, mostly run large.

It is also worth noting that there is considerable variation in wing form in the specimens of *cunea*, the width varying from 5 to 8 mm. in almost the same wing length. So we have in *cunea* a variable species that is known to extend well into Georgia, whose range of size equals that given by Mr. Walker, which is common, and of which three specimens might easily be picked up in general collecting.

We have, on the other hand, *antigone*, which is generally rare, which, even in the latitude of New Jersey, is taken very infrequently, in single specimens only, and in immaculate or almost immaculate forms, which becomes more common northwardly, and of which we have no records of captures in the South. Four lines, or one-third of an inch, is a considerable range of variation. None of my examples exceed and only one equals the twenty lines given by Walker, and none are less than full 17 lines. It seems to me, aside from the statements made by Mr. Butler, that the probabilities are against Walker having had three specimens of banded *antigone* before him, while it would be an easy matter for him to get that number of specimens of large, banded *cunea*. I cannot, under the circumstances, feel, therefore, that the case is entirely proved, and that we have any real justification for changing the synonymy as it now stands in the lists.

ASPIDIOTUS (TARGIONIA) HELIANTHI, SP. NOV.

BY PERCY J. PARROTT, MANHATTAN, KANSAS.

♀ scale 1.6 to 1.8 mm. in diameter, .5 to .6 mm. in altitude, circular, quite convex, roughish, a light brown with slight tinge of pink; ventral scale thick, white at centre with brown on margin, not easily separated from scale, when detached from host plant leaves but a very slight trace of white; exuviae sublateral, often nearly marginal, orange, covered with whitish secretion.

♀ oval, deep yellow, with dark brown on margin of posterior segment, and yellowish brown about mesal lobes and region of proboscis. When boiled in caustic potash becomes transparent, with mesal lobes a yellowish brown, and region of proboscis a reddish brown.

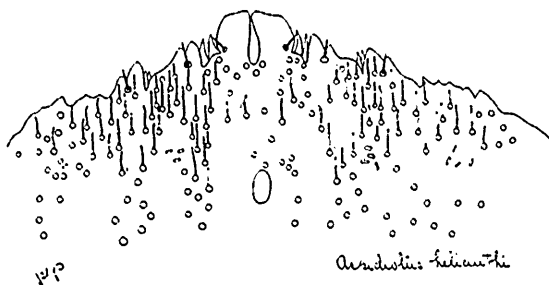


FIG. 30.

There are three pairs of lobes; mesal large, more narrow at base, broadening posteriorly, almost contiguous at apical end and quite widely separated at base, distal end either notched so as to resemble a human molar or almost truncate and broadly rounded on outer margin; second and third pairs of lobes small, bilobed, and mere tooth-like projections. In some specimens there is a small rudimentary fourth lobe. The margin laterad of third pair of lobes very notched. The first interlobular opening broad, in some specimens equalling in width the base of mesal lobes.

Plates simple and short, projecting very little above margin. There are generally two to each incision; those of first incision the largest, the remaining apparently very rudimentary.

Spines small, one on lateral of each lobe. Anal opening quite distant from margin. Tubular glands very numerous, as will be seen in drawing.

This species was found by the writer on March 24th, 1899, on roots of a sunflower, *Helianthus annuus*, near Hackberry Glen, Wabawsec Co., Kansas.

THE NORTH AMERICAN SPECIES OF ORPHULELLA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

By the kindness of Prof. L. Bruner I have recently been able to study specimens of the South American *Orphula pagana* Stal., the type of the genus, and so to compare its structure with that of our native species latterly referred to *Orphula*. By this it appears, as Mr. Bruner has pointed out to me in correspondence, and as Mr. A. P. Morse has suggested (*Psyche*, VII., 407), that our species should be referred rather to *Orphulella*, separated by Giglio-Tos from *Orphula* in 1894, though this was afterwards regarded by him as having only a subgeneric value. *Orphula* in the stricter sense of the term is not, so far as I know, represented in the United States. *Orphulella* is the most widely distributed genus of North American Tryxalinæ and the most abundant in species. Those known to Prof. J. McNeill in his recent revision of our Tryxalinæ were well separated by a table which I have here made the basis of a new one to include a considerable number of new forms. Besides describing these, I have added notes of distribution of the others, based on the collections in my hands, and given their principal synonymy.

Table of the North American species of Orphulella.

*A*¹. Discoidal area of basal half of female tegmina generally plainly narrowed distally, where it is nearly always occupied by a single row of cells and is plainly narrower than the ulnar area at its widest part; ulnar area of male occupied by a single row of cells, rarely (tepaneca*) partially divided into two sets by an irregular spurious vein.

*b*¹. Lateral carinæ of pronotum parallel or very faintly arcuate on the prozona.

*c*¹. Male antennæ no longer than head and pronotum together, basally depressed and apically acuminate or subacuminate.

*d*¹. Pronotum less obtusely angulate; prozona and metazona subequal in length; tegmina generally not surpassing the hind femora, the discoidal area in both sexes with a spurious vein running through the middle, dividing it into two sets of cells; ulnar area with a similar (♀) or interrupted (♂) spurious vein, making a similar division. *tepaneca*.

*It is a little difficult to say into which division *tepaneca* should fall, as it is somewhat variable; by the male it falls best here; by the female under *A*².

*d*². Pronotum very obtusely angulate; prozona distinctly longer than the metazona; tegmina generally surpassing the hind femora, the discoidal area of both sexes more or less irregularly reticulate, but with no spurious vein; ulnar area with a spurious vein in the female but not in the male. *compta*.

*e*¹. Male antennæ a little longer than head and pronotum together, of equal size throughout and nowhere flattened. *decora*.

*b*². Lateral carinæ of pronotum distinctly, often greatly, divergent both in front and behind.

*c*¹. Anterior ulnar vein of male tegmina distally much nearer the radial than the lower ulnar vein.

*d*¹. Larger species. Narrowest (middle) portion of pronotal disk more than three-fourths as wide as widest (posterior) portion. *obliquata*.

*d*². Smaller species. Narrowest (middle) portion of pronotal disk not more, generally less, than three-fourths as wide as the widest (posterior) portion.

*e*¹. More or less variegated, the tegmina usually with a median series of spots; male antennæ no longer than head and pronotum together; hind margin of pronotum obtusely angulate.

*f*¹. Fastigium of vertex less sharply angulate and less prominent, in the male advanced beyond the eyes by not more than a third the length of the eye as seen from above, in the female generally rounded obtusangulate. *picturata*.

*f*². Fastigium of vertex more sharply angulate and more prominent, in the male advanced beyond the eyes by half or nearly half the length of the eye as seen from above, in the female generally distinctly rectangular. *affinis*.

*e*². Rarely variegated, the tegmina usually immaculate; male antennæ longer than head and pronotum together; hind margin of pronotum rounded, scarcely angulate. *speciosa*.

*c*². Anterior ulnar vein of male tegmina distally equidistant between the radial and lower ulnar veins. *desereta*.

*A*². Discoidal area of basal half of female tegmina scarcely narrowing distally and here nearly always occupied by more than one row of cells, and little if any narrower than the ulnar area at its widest part; ulnar area of male either divided into two series of cells by a more or less

distinct spurious vein, or irregularly reticulate, never occupied throughout by a single series of cells.

*b*¹. Lateral carinæ of pronotum arcuate, the disk of unequal width, being narrower, often considerably narrower, in the middle than behind and generally than in front.

*c*¹. Antennæ of male considerable longer than head and pronotum together.

*d*¹. Disk of pronotum only slightly clepsydral, the lateral carinæ diverging but little or not at all in front and not greatly behind; tegmina of male generally but little if at all surpassing the hind femora.....*salina*.

*d*². Disk of pronotum considerably clepsydral, the lateral carinæ diverging noticeably both in front and behind, but especially behind; tegmina of male generally considerably surpassing the hind femora.....*pratorum*.

*c*². Antennæ of male no longer or scarcely longer than head and pronotum together.

*d*¹. Fastigium of vertex generally rectangular in front; disk of pronotum distinctly clepsydral, the lateral carinæ distinctly and often considerably divergent both in front and behind; ulnar area of tegmina, even in the male, but little wider than the discoidal area.....*pelidna*.

*d*². Fastigium of vertex usually acutangulate in front; disk of pronotum feebly clepsydral, the lateral carinæ scarcely or not diverging in front and not greatly behind; ulnar area of tegmina, especially in the male, distinctly wider than the discoidal area.....*olivacea*.

*b*². Lateral carinæ of pronotum subparallel, so that the disk is of subequal width throughout.

*c*¹. Antennæ of female no longer or scarcely longer than the pronotum, distinctly flattened; face little oblique.....*viridescens*.

*c*². Antennæ of female distinctly longer than the pronotum, cylindrical; face considerably oblique.....*Scudderi*.

Having seen no specimens of *O. orizabæ* McNeill, I am unable to give it a place in the table, but it will fall in the close vicinity of *O. tepaneca*.

ORPHULELLA TEPANECA.

Stenobothrus (Rhammatocerus) tepanecus Sauss., Rev. Mag. Zool., 1861, 319 (1861).

Stenobothrus tepanecus Walk., Cat. Derm. Salt. Brit. Mus., IV., 756 (1870).

Specimens in my collection come from Corpus Christi Bay, Tex., Dec., Palmer; Mexico, Sumichrast, Botteri; Venis Mecas, Mex., Palmer; San Mateo del Mar, Tehuantepec, Sumichrast; Guatemala, Van Patten; and Realejo, Nicaragua, McNeill.

The species described by McNeill under the name *Orphula tepanica*, and doubtfully referred by him to Saussure's species, belongs, I think, to another species which I have here named *Orphulella affinis*.

ORPHULELLA COMPTA, sp. nov.

Green or dead-leaf brown, frequently with a broad dusky occipital stripe on the head, and always with a postocular fuscous stripe, more or less conspicuous, generally rather broad, straight, and cut by the lateral carinæ of the metazona. Head generally more or less flavous on the face, of medium size, the face considerably oblique; fastigium considerably depressed behind the raised margins, which are rectangulate (♀) or a little acutangulate (♂), with rounded apex, advanced in front of the eyes by less than the width between the eyes; frontal costa not very prominent, rather narrow, plane or faintly sulcate and sparsely punctate, percurrent or almost percurrent, and slightly enlarged below; lateral foveolæ faint, linear, brief; eyes moderately large, subovate; antennæ as long as (♂) or slightly shorter than (♀) the head and pronotum together, luteo-testaceous, the post-basal joints depressed but not broadened. Pronotum rather short, obtusely angulate behind, the prozona distinctly longer than the metazona, the lateral carinæ almost parallel on the prozona, considerably divergent on the metazona, luteous and noticeably dividing the postocular fuscous stripe. Tegmina generally slightly surpassing the hind femora, the discoidal area of basal half narrowed distally, more or less irregularly reticulate, but with no spurious vein; ulnar area without (♂) or with (♀) a spurious vein; median area often flecked or more or less clouded with fuscous. Hind femora considerably surpassing the abdomen, moderately slender, green or testaceous.

Length of body, ♂, 16 mm., ♀, 22 mm.; antennæ, ♂ ♀, 6.25 mm.: pronotum, ♂, 3.25 mm., ♀, 4.25 mm.; tegmina, ♂, 14 mm., ♀, 16.25 mm.; hind femora, ♂, 10.5 mm., ♀, 13.5 mm.

26 ♂, 19 ♀. Palm Springs, Cal., July 10-13; Yuma, Ariz., July 5, A. P. Morse.

ORPHULELLA DECORA.

Orphula decora McNeill, Proc. Dav. Acad. Nat. Sc., VI., 239-240, pl. 4, fig. 17d (1897).

I have specimens which I refer to this species taken by Belfrage in Bosque Co., Tex., and by myself at Pueblo, Col. It was originally described from Arkansas.

ORPHULELLA OBLIQUATA, sp. nov.

Green or brown, marked with fuscous. Head moderately large, flavo-testaceous with a greenish tinge, often green or brownish testaceous above, with a broad postocular fuscous or greenish fuscous stripe, deepest in colour above; vertex well arched, the fastigium rectangulate (♂) or obtusangulate (♀) in front, with raised margins, before which the surface is depressed; lateral foveolæ faint, linear; face arcuate, not very strongly retreating; frontal costa percurrent, rather narrow, faintly enlarging from apex to base, plane or in the female sometimes faintly sulcate; eyes moderate; antennæ castaneous, sometimes apically infuscated, scarcely depressed basally, in the female shorter than head and pronotum together. Pronotum of moderate length, the hind margin very obtusangulate, the lateral carinæ usually flavous, and cutting the generally broad fuscous postocular stripe, which lies anteriorly below, posteriorly within them, gently arcuate, the disk narrowest in advance of the middle, but here fully three-fourths as wide as posteriorly. Tegmina extending about as far back as the hind femora, the discoidal area of the basal half narrowing a little distally, and in this distal portion occupied by only a single row of cells, and much narrower than the widest part of the ulnar area, the latter occupied in the male by only a single row of cells, the anterior ulnar vein distally much nearer the radial than the lower ulnar vein; median area in basal two-thirds marked interruptedly with fuscous. Hind femora surpassing the abdomen, slender, compressed, green or brown, the outer face more or less infuscated.

Length of body, ♂, 19 mm., ♀, 21.5 mm.; antennæ, ♂, 5 mm., ♀, 5.5 mm.; pronotum, ♂, 3.6 mm., ♀, 4.1 mm.; tegmina, ♂, 17 mm., ♀, 18.5 mm.; hind femora, ♀, 14 mm.

1 ♂, 6 ♀. Dallas, Tex., Boll.; Fort Collins, Col., Baker.

ORPHULELLA PICTURATA, sp. nov.

Green or brown, marked with fuscous. Head of moderate size, lighter coloured below than above, with or without a generally slender postocular fuscous stripe; vertex gently arched, the fastigium depressed behind the raised margins, which are rectangulate (♂) or feebly obtusangulate (♀) in front, the fastigium not advanced beyond the eyes by more than a third the length of the eyes as seen from above; lateral foveolæ obsolete; frontal costa percurrent, narrow above, regularly enlarging to twice the width below, sparsely punctate, plane; eyes moderate; antennæ luteo-castaneous, apically infuscated, in both sexes much shorter than head and pronotum together, feebly depressed basally. Pronotum rather short, the hind margin obtusely angulate, the lateral lobes generally much infuscated, and obscurely and rather irregularly pictured, often with a slender fuscous stripe next the lateral carinæ, below them on the prozona, within them on the metazona, the carinæ somewhat arcuate, diverging posteriorly more than anteriorly, and the disk at its narrowest less than three-fourths as wide as posteriorly. Tegmina green or brown, usually with a median series of more or less confluent fuscous maculations, the discoidal area of the basal half of the tegmina narrowing a little distally in the female, and here occupied by one or sometimes partially by two rows of cells, narrower than the widest part of the ulnar area, the latter occupied in the male by a single row of cells, the anterior ulnar vein very much nearer the radial than the lower ulnar vein. Hind femora extending about as far as the tegmina, and, at least in the male, well beyond the abdomen, slender, compressed, green or brownish testaceous, more or less infuscated.

Length of body, ♂, 15.5 mm., ♀, 21 mm.; antennæ, ♂, 4.6 mm., ♀, 5.5 mm.; pronotum, ♂, 3.1 mm., ♀, 3.5 mm.; tegmina, ♂, 11.5 mm., ♀, 16 mm.; hind femora, ♂, 9 mm., ♀, 13.25 mm.

18 ♂, 20 ♀. Dallas, Tex., Boll.; Texas, Belfrage. Mr. A. P. Morse also took this species June 25th, by the railway in Texas, at Rosenberg, Walden, Pierson, Eagle Lake, and Flatonia.

ORPHULELLA AFFINIS, SP. NOV.

? *Orphula tepanica* McNeill (nec *tepaneca* Sauss.), Proc. Dav. Acad. Nat. Sc., VI., 242-243, pl. 4, fig. 17a (1897).

Brown, rarely green, with the usual markings of the genus, the broad occipital dusky stripe generally darker at the margins, the fuscous postocular stripe cut on the metazona by the luteous lateral carinae. Head of moderate size, the face considerably oblique, the fastigium advanced beyond the eyes in the male by half or nearly half the length of the eyes as seen from above, acutangulate in the male, rectangulate in the female, in both much depressed behind the strongly raised margins; frontal costa narrow, sulcate, enlarging below the ocellus, sparsely punctate; lateral foveolæ obsolete; eyes normal; antennæ slightly (♂) or much (♀) shorter than head and pronotum together, castaneous, apically infuscated, the post-basal joints depressed but not broadened. Pronotum not very long, the hind margin obtusely angulate, the prozona faintly longer than the metazona, the lateral carinae divergent both in front and behind, and the narrowest part of the disk thus limited not more than three-fourths as wide as the posterior portion. Tegmina generally surpassed a little by the hind femora, the median area usually maculate, the discoidal area of the basal half narrowed distally in the female, and occupied by only a single series of cells, the anterior ulnar vein of male distally much nearer the radial than the lower ulnar vein, the ulnar area occupied by a single series of cells. Hind femora considerably surpassing the abdomen, the hind tibiae dull luteous, with a very obscure pallid postgenicular annulus.

Length of body, ♂, 17 mm., ♀, 24 mm.; antennæ, ♂, 5.75 mm., ♀, 5 mm.; pronotum, ♂, 3.5 mm., ♀, 4.5 mm.; tegmina, ♂, 12 mm., ♀, 17 mm.; hind femora, ♂, 10.5 mm., ♀, 13.5 mm.

19 ♂, 23 ♀. San Diego, Cal., July 22; Coronado, Cal., July 24, and Kern City, Cal., Aug. 4, A. P. Morse; Colorado Desert, Cal., Aug. 13, Mus. Stanf. Univ.

ORPHULELLA SPECIOSA.

Stenobothrus speciosus Scudd., Bost. Journ. Nat. Hist., VII., 458 (1862).

Orphula speciosa McNeill, Proc. Dav. Acad. Nat. Sc., VI., 240-242, pl. 4, fig. 17c (1879).

Stenobothrus aequalis Scudd., Bost. Journ. Nat. Hist., VII., 459-460 (1862).

Stenobothrus bilineatus Scudd., *Ibid.*, VII., 460-461 (1862).

Stenobothrus gracilis Scudd., *Rep. U. S. Geol. Surv. Nebr.*, 25c (1871).

I have before me a series of specimens from Halifax, N. S., Piers; Moosehead Lake, Scudder; Norway, Smith; Mt. Desert, Scudder, and Brunswick, Me., Packard; the White Mt. Valleys and Hampton, N. H., Scudder; Brandon, Vt., Scudder; Summit of Graylock, Boston, Cape Cod and Nantucket, Scudder, and Blue Hills, Henshaw, and Wellesley, Mass., Morse; Farmington, Norton, and Thompson, Conn., Morse; Minnesota; Colona, McNeill and Ogle Co., Ill., Allen; Denison, Crawford Co., Dallas Co., and Jefferson, Iowa, Allen; Nebraska, Dodge, and West Point, Bruner, and the Valley of the Platte, Nebr., Hayden; and Bosque Co., Tex., Belfrage.

ORPHULELLA DESERETA, sp. nov.

Pale gray-green, the green prevailing in the female, the gray in the male, both marked with fuscous in the usual manner. Head moderately large and prominent, the face rather pallid and moderately oblique, more so in the male than in the female, marked behind the eyes with a sometimes slender, sometimes broad, postocular fuscous streak, sometimes edged above with luteous; vertex well arched, more or less sometimes very slightly infuscated, the infuscation often concentrated in a pair of longitudinal stripes; fastigium well advanced, depressed before the raised margins, which are rectangulate or slightly acutangulate (δ) or obtusangulate, the apex rounded (♀); frontal costa narrow above, broadening below the ocellus, plane or feebly sulcate near the middle; eyes moderate; antennæ a trifle longer (δ) or distinctly shorter (♀) than the head and pronotum together, luteous, apically considerably infuscated, the post-basal joints somewhat depressed. Pronotum of moderate length, broadly rounded obtusangulate behind, the lateral carinæ luteous, cutting the generally narrow postocular fuscous stripe, considerably arcuate, diverging more posteriorly than anteriorly, the disk at the narrowest about two-thirds as broad as the widest posterior part, the lateral lobes below the postocular stripe immaculate or clouded above with fuscous. Tegmina somewhat surpassing the abdomen, the median area maculate with fuscous, the discoidal area of the basal half in the female distally narrowed slightly and a trifle wider than the widest part of the ulnar area, occupied partly by a single, partly by a double row of

cells, the ulnar area of the male occupied by a single row of cells, one or two of which are sometimes divided to form part of a second row, the anterior ulnar vein running distally about midway between the radial and the lower ulnar vein. Hind femora extending about as far back as the tegmina, slender, compressed, generally immaculate, but occasionally obscurely bifasciate with fuscous.

Length of body, ♂, 18.5 mm., ♀, 24 mm.; antennæ, ♂, 7 mm., ♀, 6.5 mm.; pronotum, ♂, 3.25 mm., ♀, 4 mm.; tegmina, ♂, 14 mm., ♀, 18 mm.; hind femora, ♂, 10 mm., ♀, 13.5 mm.

19 ♂, 11 ♀. Salt Lake Valley, Utah, Aug. 1-4.

ORPHULELLA SALINA, sp. nov.

Green or brown, marked with fuscous. Head moderately large and prominent, the face paler than the rest and moderately oblique, the postocular fuscous stripe usually present and usually slender; vertex rarely infuscated, moderately convex, the fastigium considerably depressed behind the well elevated margins, which are rectangulate, well advanced, in the male sometimes acutangulate; lateral foveolæ obsolete; frontal costa narrow, faintly broadening below, more or less sulcate, especially in the male; eyes of medium size; antennæ somewhat longer (♂) or slightly shorter (♀) than head and pronotum together, pale testaceous, apically infuscated, slightly depressed in the basal half. Pronotum of moderate length, rounded subtruncate behind, the lateral carinæ luteous, cutting the narrow fuscous postocular stripe, gently arcuate, diverging but little, occasionally not at all in front, and but little behind. Tegmina but little if at all surpassing the hind femora, the median area especially in the female maculate with fuscous, the discoidal area of basal half not narrowed distally in the female, nor narrower than the ulnar area, and filled irregularly with a double row of cells, the ulnar area of the male with a spurious vein dividing it through at least most of its course so as to form a double row of cells. Hind femora reaching (♀) or surpassing (♂ ♀) the abdomen, only moderately slender and compressed, immaculate.

Length of body, ♂, 16 mm., ♀, 23 mm.; antennæ, ♂, 5.75 mm., ♀, 6.5 mm.; pronotum, ♂, 2.75 mm., ♀, 4 mm.; tegmina, ♂, 14 mm., ♀, 18 mm.; hind femora, ♂, 9.5 mm., ♀, 11.75 mm.

7 ♂, 17 ♀. White River, Col., at Utah boundary, July 24 to Aug.

13; Provo, Utah, Aug. 23-24; Salt Lake, Utah, Packard; Spring Lake Villa, Utah Co., Utah, Aug. 1-4, Palmer.

ORPHULELLA PRATORUM, sp. nov.

Green or brown, generally the latter, marked variably with fuscous, but generally with a broad and distinct blackish fuscous postocular stripe on head and pronotum, cut on the latter by the luteous lateral carinæ; head occasionally with a pair of vertical fuscous stripes, enclosing a median testaceous stripe, in which case the disk of the pronotum and anal area of the tegmina are also testaceous. Head rather large and prominent, the face not very oblique; fastigium well advanced, considerably depressed behind the well elevated margins, which are rectangulate (♂) or obtusangulate (♀) in front; lateral foveolæ obscure, sub-linear frontal costa much compressed and narrowed above, gently enlarging below, feebly sulcate; eyes rather large; antennæ somewhat longer (♂) or a little shorter (♀) than the head and pronotum together, testaceous, apically a little infuscated, the post-basal joints feebly depressed. Pronotum rather long, subtruncate but obtusangulate behind, the lateral carinæ arcuate, diverging considerably both in front and behind, but especially behind. Tegmina, at least in the male, generally considerably surpassing the hind femora, the median area often maculate with fuscous, the discoidal area of basal half of female tegmina not narrowed distally nor narrower than the ulnar area, irregularly reticulate with more than a single row of cells; ulnar area of male with a distinct spurious vein dividing it so as to form a double row of cells. Hind femora surpassing the abdomen, moderately slender, often clouded with fuscous, the hind tibiæ often with a pallid postgenicular annulus.

Length of body, ♂, 21 mm., ♀, 24 mm.; antennæ, ♂, 7.5 mm., ♀, 7.4 mm.; pronotum, ♂, 4 mm., ♀, 4.5 mm.; tegmina, ♂, 18 mm., ♀, 20 mm.; hind femora, ♂, 12 mm., ♀, 14.5 mm.

43 ♂, 48 ♀. Maryland, Uhler; Carolina, Schaum; North Carolina, Uhler; Smithville, N. C., Nov. 22, Maynard; South Carolina; Georgia, Morrison; Lakin, Kans., Sept. 1, Scudder; Canon City, Col.; Texas, Belfrage; Bosque Co., Tex., Oct. 15, Belfrage; Dallas, Tex., Boll.; Gulf Coast of Texas, Aaron.

Specimens from the Eastern United States are generally smaller than those from the West.

ORPHULELLA PELIDNA.

Gomphocerus pelidnus Burm. !, Handb. Ent., II., 650 (1838).

Stenobothrus pelidnus Thom., Rep. U. S. Geol. Surv. Terr., V., 95 (1873).

Orphula pelidna McNeill, Proc. Dav. Acad. Nat. Sc., VI., 235-239 (1897).

Stenobothrus maculipennis Scudd. !, Bost. Journ. Nat. Hist., VII., 458-459 (1862).

Stenobothrus propinquans Scudd. !, Ibid., VII., 461 (1862).

Specimens before me come from Boston, Blue Hills, Provincetown, Cape Cod and Nantucket, Mass.; Stamford, Conn., Morse; Staten Island, Davis, and Long Island; Minnesota; Fort Collins, Col., Baker; Capron and Fort Reed, Comstock, Appalachianicola, Thaxter, Sandford, Frazer, Charlotte Harbor and Biscayne Bay, Mrs. Slosson, and Key West, Fla., Morrison, Palmer; La Firmina, Cuba, Wright; and the Isle of Pines, Scudder; Atmore, Ala., Morse; Mesilla, N. Mex., June 29, Morse; and Colton, July 17, Los Angeles, July 26, and Gazelle, Cal., Sept. 4, Morse.

ORPHULELLA OLIVACEA.

Stenobothrus olivaceus Morse. !, Psyche, VI., 477-478, figs. 1, 2 (1893).

Orphula olivacea Morse, Ibid., VII., 327, 411, pl. 7, figs. 10, 10a (1896); McNeill, Proc. Dav. Acad. Nat. Sc., VI., 239, pl. 4, fig. 17b (1897).

Orphula (Orphulella) olivacea Gigli-Tos., Boll. Mus. Zool. Tor., XII., No. 301, 2 (1897).

Mr. Morse has given me specimens taken by him at Stamford and Norwich, Conn., and I have others from Maryland, Uhler, and Georgia, Morrison, besides a number taken by C. M. Weed on Bermuda. Gigli-Tos reports it from Panama and Venezuela.

ORPHULELLA VIRIDESCENS, sp. nov.

Green throughout, the head more or less flavescent, the disk of the metazona somewhat feebly infuscated, and the upper part of the lateral lobes bordering the carinae with a slender purplish fuscous stripe extending to the eye. Head moderately large, the face only a little oblique; fastigium a little depressed within the rectangulate margin; frontal costa moderately prominent, plane and delicately punctate, narrowed above,

very gradually enlarging to the ocellus, below which it is subobsolete; lateral foveolæ wanting; eyes moderate, subpyriform; antennæ about as long as the pronotum, with the post-basal joints distinctly depressed. Pronotum rather short, feebly rounded in front, slightly rotundato-angulate behind, the lateral carinæ subparallel, faintly sinuate, the disk narrowest behind the middle of the prozona, which is barely longer than the metazona. Tegmina barely surpassing the hind femora, the discoidal area scarcely narrowing distally and scarcely narrower than the widest part of the ulnar area, rather densely reticulate proximally, with two rows of irregular cells distally; wings with the veins of the anterior area more or less roseate. Hind femora as long as the abdomen, not very slender, green, feebly ferruginous beneath.

Length of body, 20 mm.; pronotum, 4 mm.; tegmina, 15.5 mm.; hind femora, 13 mm.

1 ♀. Mt. Alvarez, Mexico, E. Palmer.

ORPHULELLA SCUDDERI.

Ophula Scudderi Bol., Mém. Soc. Zool. France, I., 142 (1888).

I have specimens taken at La Firmina, near Bemba, Cuba, by Wright, and on the Isle of Pines by myself.

ERRATUM.

Page 121 (C. E., May, 1899), near the bottom, for "*Eudeopsylla*" and "*Eudeopsylla nigra*," read "*Udeopsylla*" and "*Udeopsylla nigra*."

SOME NEW SPECIES OF DELTOCEPHALUS.

BY E. D. BALL, FORT COLLINS, COLO.

DELTOCEPHALUS AREOLATUS, n. sp.

Resembling *imputans*, Osb. & Ball, but with a much longer vertex; vertex longer than in *producta*, Walk. Olive green, a spot on the middle and another at the tip of each elytron and all below black. Length, ♀, 4 mm.; ♂, 3.5 mm.; width, 1.75 mm.

Vertex flat, strongly acutely angled, the tip rounding, almost twice as long as the pronotum, fully twice longer than width between eyes, margin sharp, angle with the face acute; front depressed, almost as much above the ocelli as below, lateral margins straight, continuous with those of the clypeus; loræ small, two-thirds the width of the clypeus; pronotum

over twice wider than long — half the length within the anterior curve; elytra flaring, venation of the reflex-veined type, the second cross nervure wanting.

Colour: vertex yellowish olive, the tip ivory white, margined with black, pronotum olive, the anterior third yellowish, elytra pale olive, a large fuscous blotch back of the cross nervure between the sectors, and another on the margin of the third apical cell, reflexed veinlets white, margined anteriorly with fuscous, all below, except tarsi and part of the genitalia, black.

Genitalia: female, ultimate ventral segment twice the length of the penultimate, lateral margins strongly narrowing posteriorly, posterior margin angularly excavated one-third the depth of the segment, with a rounding medially cleft tooth equalling the lateral angles; male, valve triangular, the apex produced, plates narrow at base, nearly twice longer than valve, narrowing towards the blunt, angularly divergent apices.

Described from one female from Arizona (Kunze), one from College Park, Md. (Johnson), and one male from Md. (Heideman). This is another of the reflex-veined group, and would fall between *producta* and *imputans*; from the former it is readily separated by its colour, and from the latter by the much longer vertex.

DELTOCEPHALUS FLEXULOSUS, n. sp.

Form of *reflexus* nearly with narrower vertex and elytra, resembling *abbreviatus* in colour and ornamentation. Light cinereous, with the margins of the nervures and the markings on the vertex fuscous; face black above, white below. Length, ♀ 4 mm., ♂ 3.5 mm., width 1.25 mm.

Vertex one-third longer than pronotum, nearly that much longer than its basal width, disc flat, the margins sharp; face as in *reflexus*; pronotum distinctly narrower than the eyes, twice wider than long; elytra longer, narrower than in *inflatus*, with a similar venation, veins on clavus separate or only connected by a cross nervure.

Colour: light cinereous washed with pale yellow, traces of pale olive or fuscous lines on the pronotum; margins and tip of vertex ivory white, an orange line just inside the margin and a fuscous circle around tip; elytra pale, the nervures creamy white with narrow fuscous margins, a fuscous spot either side the cross nervure on the clavus, and a larger pair next the first cross nervure on the corium, the apical margin and the anterior margins of the reflexed veinlets fuscous; upper half of face shin-

ing black, with traces of four light arcs, lower half light lemon-yellow.

Genitalia: female, ultimate ventral segment resembling *abbreviatus*, twice longer than penultimate, lateral margins narrowing posteriorly, posterior margin angularly emarginate, a broad wedge-shaped median tooth extending beyond the lateral angles, the apex slightly notched in the middle and arcuated either side; male, valve broad, triangular, plates narrow convex, half longer than valve; pygofers longer than plates, compressed ventrally, forming a blade-like structure, for the reception of which the plates are notched half way to the base.

Described from numerous specimens taken at Fort Collins, Colo., and back into the mountains to the Little Beaver (9,500 feet), also specimens from Windsor, Estes Park, Denver and Holly in Colo., and from Western Kansas. The black on the upper half of the face will serve to separate it from all but *reflexus* and the following species, and from these it may be distinguished by the flat pygofers and the notched plates.

DELTOCEPHALUS STYLATUS, n. sp.

Similar in form and colour to *flexulosus*, but broader, as broad as *inflatus*, with the black on the face and the flaring elytra of *reflexus*. Length 4.5 mm., width 1.75 mm.

Vertex one-third longer than pronotum, little longer than its basal width; width across eyes equal to the combined length of pronotum and vertex; front and clypeus proportionally broader than in *flexulosus*; elytra longer than abdomen in most specimens; venation as in *inflatus*, the basal angle of the third apical cell a right angle, claval nervures separate.

Colour: pale cinereous, vertex greenish, markings on margin and tip as in *flexulosus*, a transverse band on either side before eye and a spot in the middle of either side at the base fuscous; pronotum with a sub-marginal row of fuscous spots; elytra pale, with dark margined nervures and fuscous markings as in *flexulosus*.

Genitalia: female, ultimate ventral segment over two and one-half times as long as penultimate, lateral margins nearly parallel, posterior margin straight, produced on the middle third into an obtusely triangular tooth, which is bifid at the apex and bears a small lateral tooth at about the middle of either side; male, valve equilaterally triangular, plates narrow, extending beyond the valve scarcely its length, roundly divergent at the apex, where they are half as wide as at the base, their tips roundly emarginate, pygofers inflated, extending considerably

beyond the plates, their inner margins extending into a pair of narrow, curved, black, style-like processes.

Described from five males and five females swept from prairie grass at Little Rock, Iowa, by the author.

DELTOCEPHALUS MISSELLUS, n. sp.

Form and general appearance of *Sayi*, but smaller and lighter coloured, resembling the European *picturatus* and *flori*, but readily separated by the genitalia. Length 2.75-3 mm., width 1 mm.

Vertex flat, right angled before, its length and basal width equal, one-third longer on middle than against eye, slightly longer than pronotum; face as in *Sayi*, the front narrow, wedge-shaped, the lateral margins continuous with those of the clypeus; pronotum over twice wider than long; elytra broad and short, broadly rounding behind, the apical cells little longer than their apical width; elytra shorter than the abdomen in the female, longer in the male.

Colour: pale cinereous washed with yellowish brown, the anterior half of the vertex, except the lateral margin, brownish fuscous, divided into four quadrants by a light cross, the anterior pair darkest on the oblique margins; pronotum irregularly marked with fuscous; elytra pale cinereous, the nervures whitish, irregularly margined with fuscous, the white emphasized on all the transverse nervures; face olive fuscous, short arcs on the front, a median line on the lower half, a spot on the loræ and the margins of the clypeus and genæ light; below fuscous, legs light, anterior femora annulate.

Genitalia: female, ultimate ventral segment half longer than penultimate, the posterior margin slightly, roundly produced in the middle half, the apex nearly truncate; male valve obtusely triangular, plates broad at base, rapidly narrowing to the acute slightly divergent points, not quite half longer than the valve, concealing the pygofers.

Described from numerous specimens taken between Rist Canon (6,000 feet) and the head waters of the Little Beaver (9,500 feet), one specimen from each, Estes Park, Pinewood and Steamboat Springs, and several from Marshall's Pass, all points being in the mountains of Colo.

DELTOCEPHALUS VINCULATUS, n. sp.

Form and structure of *signatifrons* nearly, broader and more distinctly marked. Pale cinereous marked with rust brown and fuscous; two broad, transverse fuscous bands on the pale elytra. Length, ♀ 3.5 mm., ♂ 3 mm.; width 1.75 mm.

Vertex flat, slightly obtusely angled, one-third wider than the middle length, over three-fourths the length of the pronotum, face and facial angle as in *signatifrons*; pronotum shorter, over twice wider than long; elytra equalling the abdomen in the female, slightly longer in the male, shorter than in *signatifrons*, with a very slight appendix, venation as in *cruciatus*.

Colour: vertex with the margins, a median stripe and a short transverse bar before the middle always light, the remainder of the disc with a very variable amount of fuscous, fading out posteriorly into a rust brown; pronotum irregularly marked with rust brown—in the darker specimens arranged in longitudinal stripes; elytra pale, subhyaline, the nervures white, a broad, slightly oblique band across the middle, another before the tip, and spots on the margins of the second and third apical cells fuscous.

Genitalia: female, ultimate ventral segment short, the lateral angles acute, posterior margin roundly emarginate either side of a large, acutely pointed, black tooth, which is cleft nearly to its base; either side of this tooth the oblique finger-like plates are exposed; male valve obtusely angulate, longer than the ultimate segment, plates broad at base, slightly narrowing to the truncate tips, where they are two-thirds the basal width, two and one-half times the length of the valve, set obliquely together, forming a trough.

Described from numerous specimens swept from the meadows of the Little Beaver, in the mountains west of Fort Collins, Colo.

CTENUCHA CRESSONANA.

In the recent volume published by the British Museum (Natural History), Sir Geo. Hampson refers this species, described by me in 1863, as the same with *C. venosa*. The material in the British Museum from North America: Texas, Grote and Zeller collections, is all *C. venosa*. *C. Cressonana*, from Colorado, is clearly distinct, a larger species more of the type of *C. virginica*, and I can only suppose that unacquaintance with my type has led to the present lumping. I may also add, that it can hardly be settled in the British Museum, whether the Californian *Scepsis Packardi*, which has lighter tinted primaries, and greater extension of a paler yellow on the head, be a local race of *S. fulvicollis* or not. From analogy in the group, it will probably prove distinct.

Roemer Museum, Hildesheim, Germany. A. RADCLIFFE GROTE.

A NEW COSSONUS.

BY ANNIE TRUMBULL SLOSSON.

In the CANADIAN ENTOMOLOGIST (Vol. XXVII., p. 322), the late Dr. John Hamilton, in an interesting article on the Coleoptera of Lake Worth, Florida, referred to a new species of *Cossonus* found there. He speaks of taking, under the bark of a dead limb of the Rubber tree (*Ficus aurca*), five examples of a new *Cossonus*, with basal half of the elytra, metasternum and abdomen rufous. He gives no other description nor does he name the beetle.

In March of the present year, at Miami, on Biscayne Bay, Florida, I found several specimens of what is evidently the same species referred to by Dr. Hamilton. They were under the bark of a fallen and dead Rubber tree. It seems proper and befitting that Dr. Hamilton's name should be associated with this beetle, and I have ventured to describe it below under the specific name of *Hamiltoni*. I trust it will not be considered out of place here for me to speak of my affection, respect and admiration for the good Doctor. We never met face to face, but we corresponded for several years, and he gave me great assistance in my studies among insects. His letters were marked by unflinching courtesy and kindness, gratitude for even the smallest favour from me, appreciation of the most unimportant discovery I might make. As do many others, I remember him and miss him continually.

Cossonus Hamiltoni, n. sp.—Black, shining, with basal half of elytra, the metasternum and abdomen rufous; antennæ and legs dark red. Rostrum stout, finely and closely punctulate, very abruptly and almost transversely-quadrangularly dilated at apex, the dilated portion barely as long as the basal portion.

Thorax oblong, with a triangular depression extending from base to near apex and having a feebly indicated and sometimes slightly elevated median line. The punctures in this depression are coarse and irregular, on sides of thorax smaller and more regular. Elytra slightly wider than base of thorax, surface rather deeply striate at base; striæ with close, deep punctures, but not impressed at apical portion. Prosternum very coarsely and somewhat densely punctate; mesosternum more sparsely punctured; as are also the metasternum and first two abdominal segments.

Length—exclusive of rostrum—2.9–4 mm.

Locality: Miami, Biscayne Bay, Fla.

CORRESPONDENCE.

LEUCOBREPHOS MIDDENDORFI.

When I was the other day looking over some of the back numbers of the CANADIAN ENTOMOLOGIST I came across an account of the taking of *Leucobrephos Middendorfi*, Men., by Mr. Hanham, of Winnipeg. I believe that this species is not generally to be found in collections. Here I cannot call it uncommon. I see, on an average, quite half a dozen specimens every spring, but the moth, from its habits, is most difficult to capture. It appears with the first warm days of spring, flying in the sunshine, low down amongst the stems of short scrub, generally that in which the black cherry predominates, and over banks of melting snow, the remains of drifts, a situation in which it is impossible to use a net, and all one can do is to look at and long for it. When it does venture out into the open its colour so coincides with the prevailing grayness of its surroundings, and renders it so inconspicuous, that, with the addition of its erratic flight, it is most difficult to net. I have only taken two, and I should be sorry to say how many I have missed, and I am not a "bad shot" on the whole. It is always turning up, too, at unexpected and inconvenient times. This spring I walked about one warm day, April 13th, till I was tired without getting a chance. Shortly after I had given the moth up, hearing a commotion among my poultry, I ran down to the stables with my gun. The hawk did not wait for me, but I saw Middendorfi flying very quietly about a heap of manure outside the door of one of my stables, where he could have been easily netted had I but been prepared. My house, stables, etc., are surrounded by scrub of various sorts. E. FIRMSTONE HEATH, Cartwright, Man.

THE TOBACCO FLEA-BEETLE (*Epitrix parvula*) ATTACKING TOBACCO
IN BARN.

In Dr. Howard's excellent treatise on this beetle in the Yearbook of the United States Department of Agriculture for 1898, pp. 123-5, no mention is made of the depredations of the insect in tobacco after it has been gathered and hung in the tobacco barn. Last year, in Southern Ohio, these beetles were found to have worked serious injury to tobacco in the fields, especially to the lower leaves. In these fields the beetles ate holes in the larger leaves, and when the leaf was not eaten through the remaining tissue, when dry, would break up and disappear, thus

leaving holes. It seems that while the tobacco is cut and piled in the fields, awaiting transportation to the tobacco barn, the beetles collect among the leaves, remain there, and are removed with the tobacco. After the tobacco is hung up to cure in the barn the beetles continue their attack on the younger and more succulent *upper leaves* (the lower when hung up), and by eating these, especially along the midrib, do even more injury than in the fields, as this last attack not only causes holes in leaves not previously injured, but discolours them also. Between the two attacks the damage is very serious. F. M. WEBSTER.

The Entomological Society of Albany has recently been organized, with an initial membership of about twenty, under the following officers: Dr. E. P. Felt, President; Prof. Charles S. Gager, Vice-President; Mr. Charles S. Banks, Rec. Sec.; Miss Margaret F. Boynton, Corr. Sec.; Prof. H. M. Pollock, Treas. The headquarters of the society will be, for the present, at the office of Dr. Felt, the State Entomologist, where the regular meetings will be held the second Friday of each month. The objects of the society are the promotion of interest in entomological science and the furtherance of fellowship among those interested for their mutual benefit and enjoyment.

SIR,—In your May issue Mr. Lyman reviewed my Synonymic Catalogue of North American Butterflies. There is one point he mentions which deserves explanation. He says: "In this catalogue Dr. Skinner has followed very closely on the lines laid down by Mr. Edwards in his lists, so far as the species are concerned, and with a conservatism which is striking when compared with his rather sweeping radicalism as expressed in his article, 'Impressions received from a Study of our North American Rhopalocera,' in Jour. N. Y. Ent. Soc., IV., 107." Prof. Cockerell, in Science, IX., No. 219, expresses himself in the same way, and says: "There is no tendency to 'lumping' exhibited, which is rather surprising in consideration of some of Dr. Skinner's previously expressed views." I did not think a catalogue the proper place to introduce into the synonymy what have been previously recognized as valid species. No reasons could be given for such changes in a list of names, and if I had "lumped" species they would have represented nothing but the bare opinion of one individual. The proper place to make such changes is in monographs and revisions, where the reasons therefor may

be fully and accurately stated. Where changes were made in the synonymy, in the catalogue, they represented published views on the subject, often expressed by a number of authors. Mr. Lyman himself covers the ground fairly well in the 29th Rept. Ent. Soc. Ont., p. 18, where he says: "In entomology, as no doubt in other branches of natural science, some men are lumpers and others splitters. To the latter I would say that the describing of new species should certainly not be done on the chance of their proving distinct, and to the former that once a form has been described as a new species IT SHOULD NOT BE LUMPED EXCEPT UPON OVERWHELMING PROOF." I may state that I still think quite a number of the names listed in the catalogue will prove synonyms, but we need proof, or opinions based on proof, with the REASONS set forth to prove the case.

HENRY SKINNER, Philadelphia.

NOTE BY MR. LYMAN.—Dr. Skinner is no doubt correct in his view that a cataloguer should not be a lumper, but at the same time it is, I think, usually expected that a catalogue should reflect in some degree the more conservative views of its compiler.

Under *Chionobas Tarpeia* Dr. Skinner very properly explains that there is considerable doubt of the species having ever been taken in North America, and if the species of *Argynnis* of the *Eurynome* group had been followed by a note to the effect that their distinctness was open to considerable doubt, no one could have objected, and such a note would tend to attract more attention to the study of these interesting forms. But Dr. Skinner went much further in the case of the Pacific Coast forms of *Chionobas* in lumping *Gigas*, Butl., *Californica*, Bdl., and *Iduna*, Edw., under *Nevadensis*, Felder.

No monographic work had been done in this case except by Edwards, who maintains the distinctness of the forms. Elwes had "revised" *Oeneis*, but in the case of these species had added nothing to what was already known about them.

H. H. L.

MR. R. A. COOLEY, assistant to Prof. Fernald in the Insectary of the Massachusetts Agricultural College, has received the appointment of Professor of Zoology and Entomology in the Montana State College at Bozeman, Mont. Mr. Cooley has just completed a monograph of the genus *Chionaspis*, which will shortly be published.