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A GENERIC SYNOPSIS OF THE FULGORIDÆ.

By Wm. H. Ashmead.

[Continued from page 141, Vol. IV.]

Family II. FULGORIDÆ.

Head of various forms, often with a cephalic prolongation and sometimes luminous. The frons nearly always keeled. Ocelli 2, rarely 3 or wanting, placed beneath the eyes or sunken in the cheeks close to the eye, the third ocellus, when present, placed in the middle of the frons. Antennæ always beneath the eye, usually large, distinct, the joints of which are frequently long and dilated, sometimes with an appendage. Thorax weak, usually keeled; scutellum small. Wings usually long and strongly veined, often short but rarely entirely wanting. Tegulæ most frequently present. Anterior coxæ generally elongated; posterior coxæ transverse, contiguous, extending from the sides of the body. Tibiæ prismatic or foliaceous. Tarsi 3-jointed, generally spined.

This is one of the most extensive of the homopterous families, well represented in North America, and comprises some of the most curious and interesting forms to be found among insects.

The family may be divided into ten subfamilies, recognizable by the aid of the following table:

TABLE OF SUBFAMILIES.

Wings when at rest not lying perpendicular in repose. ..... 2.

Wings when at rest lying perpendicular in repose.

External border of elytra without transverse, parallel nervures ..... Subfamily I. **ACANONIINÆ.**

External border of elytra with transverse, parallel nervures.

Vertex not separated from the frons by a transverse keel, or greatly prolonged into a point beyond the eyes; clavus at apex usually obtuse and usually confounded with the corium..... Subfamily II. **FLATINÆ.**

Vertex very short, front part narrow or generally rounded before the eyes, separated from the frons by a transverse keel; clavus at apex acute, distinct ....Subfamily III. **RICANIINÆ.**

2 Frons separated from the cheeks by a sharp margin.
Clypeus with marginal keels. ..... 3.
Clypeus without marginal keels, or when keeled anterior legs dilated.
Legs simple ..... Subfamily IV. **ISSINÆ.**
Legs dilated or foliaceous ..... Subfamily V. **CALOSCELINÆ.**
3 Head not prolonged beyond the eyes into a distinct cephalic prolongation; or, if prolonged then the anal area not reticulated..... 4.
Head prolonged beyond the eyes into a more or less distinct cephalic prolongation; or, if not prolonged then the anal area is reticulated.
Prothorax notably shorter and narrower than the mesothorax; elytra usually transparent and much longer than the abdomen, seldom coriaceous or shortened ..... Subfamily VI. **DICTIOPHARINÆ.**
Prothorax and mesothorax forming a rhomb nearly as long as broad; elytra usually horny..... Subfamily VII. **FULGORINÆ.**
4 First joint of the hind tarsi without a large movable spur at base .....
Subfamily VIII. **CIXIINÆ.**
First joint of the hind tarsi with a large movable spur at the base .....
Subfamily IX. **DELPHACINÆ.**
Frons not separated from the cheeks by a sharp margin .....
Subfamily X. **TETTIGOMETRINÆ.**

Subfamily I. **ACANONIINÆ.**

TABLE OF GENERA.

Vertex long, thorax not covered ..... 2.
Vertex short, thorax covered..... G. 1. **Acanonia**, A. et S.
2 Head conical, vertex oblong; wings semicircular, large.... G. 2. **Thiscia**, Stäl.
Head angularly produced.
Vertex slightly transverse; wings outwardly rounded, vertex roundedly truncated ..... G. 3. **Philatis**, Stäl.
Vertex very slightly concave; wings toward the middle gradually rounded, from thence somewhat narrow, apex truncate..... G. 4. **Chlorochara**, Stäl.

Subfamily II. **FLATINÆ.**

TABLE OF GENERA.

Basal joint of the antennæ very small, not easily distinguishable..... 2.
Basal joint of the antennæ elongated.
Basal joint shorter or as long as the second joint.
Second joint much longer than the basal ..... G. 1. **Phromnia**, Stäl.
Second joint as long as the basal ..... G. 2. **Cerynia**, Stäl.
Basal joint longer than the second ..... G. 3. **Cenestra**, Stäl.
2 Second antennal joint very long, at least as long as the breadth of the frons.....
G. 4. **Delapax**, Spinola.
Second antennal joint twice as long as broad; frons without a median keel; clypeus convex, with a feeble, sharp, median keel towards apex.....
G. 5. **Meenoplus**, Fieber.
Second antennal joint short or somewhat short.
Posterior tibiæ unarmed, without spines ..... 6.
Posterior tibiæ armed, with one spine ..... 5.
Posterior tibiæ armed, with two spines.

Vertex produced with an acute margin, flat or slightly convex.....4.
Vertex not produced, short, thrice keeled.
Thorax elevated on the disk, compressed with an acute keel on each side..3.
Thorax transversely convex.
Ocelli distinct.
Wings with two series of transverse moderately regular veins, the longitudinal vein behind and between these series, simple, not forked..... .....G. 6. **Dascalia**, Stäl.
Wings between the clavus at apex and the intercostal longitudinal vein with a regular series of distinct transverse veins, before this series nowhere wanting in irregularly disposed veins, but between the second series, veins regularly transverse; head truncate .....
G. 7. **Ormenis**, Stäl.
Wings without series, or then with irregular transverse veins, series in that case not reaching the intercostal vein....G. 8. **Flata**, Fabr.
Ocelli wanting; transverse veins of wings irregularly arranged.....
G. 9. **Pœciloptera**, Latreille.
3 Veins of wings irregularly transversely arranged ....G. 10. **Sarpanta**, Stäl.
4 Head triangularly produced; frons flat, convex at base; wings with irregular transverse veins; marginal suture straight, the angle of the suture very longly produced..... .....G. 11. **Carthaca**, Stäl.
Corium hardly longer than the clavus.
Head transversely quadrately produced, anteriorly somewhat roundedly truncated; frons somewhat concave.....G. 12. **Phlebopterum**, Stäl.
Head truncate; wings reaching somewhat beyond the apex of abdomen.....
G. 13. **Bryllis**, Stäl.
Corium nearly twice the length of the clavus.
Wings elongated, narrowed, very gradually narrowed toward the apex .....
G. 14. **Cyarda**, Walker.
5 Antennæ somewhat elongated, reaching anteriorly beyond the margins of the cheeks; ocelli subobsolete or wanting.....G. 15. **Copsyrna**, Stäl.
Antennæ short, distinct.
Transverse veins of wings irregularly arranged.
Vertex flat, produced, but the disk of thorax and scutellum not lying in the same plane .....G. 16. **Siphanta**, Stäl.
Vertex not prominent, but the frons at base prominently gibbous; thorax and scutellum convex .....G. 17. **Gyaria**, Stäl.
Transverse veins in a regular contiguous series toward apex of wings, between the apex of the clavus and the intercostal veins.....G. 18. **Petrusa**, Stäl.
Clavus without a distinct transverse vein.
Wings with an oblique transverse vein before the middle, between the interior ulnar veins and the ramus of the exterior ulnar veins .....
G. 19. **Atella**, Stäl.
6 Frons and clypeus without a median keel..... .....8.
Frons and clypeus with a median keel.
Clypeus and frons with a suture between ....7.
Clypeus and frons without a suture between.
Vertex triangular with a median keel; mesonotum lozengoidal with a median keel and straight diverging lateral keels; rostrum prolonged nearly between the middle coxæ..... ....G. 20. **Hemitropis**, Fieber.

Vertex short, concave ; frons but slightly prominent ; wings from within behind the apex of clavus not enlarged ; clavus from the exterior vein obsoletely granulated .....G. 21. **Lamenia**, Stäl.

7 Face straight; side keels of pronotum curving around the eyes. Basal antennal joint very small, annular ; second joint short, cylindrical. Elytra much longer and much narrower than the abdomen, and narrowly rounded at apex. .....
G. 22. **Haplacha**, Fieber.

Vertex narrow, quadrangularly elongated ; eyes reniform ; rostrum prolonged between the posterior coxæ .....G. 23. **Myndus**, Stäl.

Vertex nearly an iso-sceles triangle ; frons trapezoidal : eyes oval .....
G. 24. **Trigonocranus**, Fieber.

8 Vertex very short, gradually rounded off into the frons ; clavus long, acute, reaching nearly to apex of wings with one longitudinal vein and transverse veins ; wings large, roundedly truncate behind.....G. 25. **Amphiscepa**, Germar.

Subfamily III. **RICANIINÆ.**

TABLE OF GENERA.

Frons with one or three keels or keels wanting .....2.

Frons with two distinct keels, slightly converging toward apex, much longer than broad ; vertex before the eyes distinctly prominent ; lateral margins of clypeus only keeled at base. Wings as broad as long, broadly rounded at apex, with a contiguous series of transverse veins between the apex of clavus and the transverse vein of costal area, the costal area of normal breadth ; the interior vein of the corium forked before the middle.

Wings vitreous ; posterior tibiæ with three spines.....G. 1. **Miriza**, Stäl.

Wings opaque ; posterior tibiæ with four spines.....G. 2. **Mindura**, Stäl.

2 Lateral margins of clypeus keeled .....5.

Lateral margins of clypeus not keeled.

Wings much enlarged toward apex.....4.

Wings not much enlarged toward apex.

Wings as broad as long, with a regular series of transverse veins towards apex; posterior tibiæ with two spines behind the middle...G. 3. **Priœsa**, Stäl.

Wings toward apex very gradually enlarged ; posterior tibiæ with three spines behind the middle.....G. 4. **Ricania**, Germar.

3 Marginal area with very narrow transverse veins .....4.

Marginal area with normal transverse veins.

Longitudinal veins of wings much forked, with two regular series of transverse veins toward apex, joining the apical.....G. 5. **Porchazia**, A. et S.

Longitudinal veins of wings rarely forked, with two series of irregular transverse veins, remote..... G. 6. **Tarundia**, Stäl.

4 Longitudinal veins rarely emitting a forked vein from base of areole, the first forked before the base ; transverse veins very rare .....G. 7. **Armacia**, Stäl.

5 Wings nearly two and a half times longer than broad, apex subtruncate ; marginal area with narrow transverse veins ; frons as broad as long.....
G. 8. **Bladina**, Stäl.

Wings circular, half as long as broad, apex broadly rounded ; marginal area with broad transverse veins.

Wings vitreous, transverse veins remote.....G. 9. **Nagodina**, Stäl.

Wings opaque, transverse veins very numerous .....G. 10. **Vutina**, Stäl.

Subfamily IV. **ISSINÆ.**

TABLE OF GENERA.

Wings much shortened, not reaching the tip of abdomen, or rudimentary; the head produced..... 4.

Wings not unusually shortened, complete.

Head produced..... 3.

Head truncated, before the eyes not or scarcely prominent; wings strongly decumbent.

Posterior tibiæ with three spines..... 2.

Posterior tibiæ with two spines.

Costa before the middle or anteriorly beneath, very distinctly dilated; interior ulnar vein simple, exterior ulnar vein and the radial vein near the base, forked; vertex smooth....G. 1. **Hysteropterum**, A. et S.

Costa simple beneath towards the base, excepting a very obsolete dilation; wings behind the apex of the clavus oblique, very obtusely rounded, the interior ulnar vein nearly simple; first joint of posterior tarsi short ... G. 2. **Falcidius**, Stäl.

Thorax at base slightly and broadly sinuated.

Wings vitreous, regularly reticulated, obtusely rounded at apex; costa dilated, membrane of costa with transverse veins, ulnar vein in the middle of wing, forked .....G. 3. **Neæthus**, Stäl.

Wings at apex very slightly deeply angulately emarginated or incised, and rarely with transverse veins, not reticulated; the vein of the anal area forked; anterior femora simple, subcompressed..... G. 4. **Thionia**, Stäl.

Wings at apex entire; frons and clypeus lying nearly in the same plane, the frons somewhat reclining and slightly reflexed G. 5. **Issus**, Fabr.

2 Vertex very short, sublunate, anterior margin strongly carinated; frons rounded, prominent, the central plate almost circular, flattened and very much raised above the surrounding area, exterior margins strongly carinate, curving conformable with the central plate. Pronotum longer than the vertex, lunate, bluntly curved on anterior margin, posterior margin deeply sinuated. Hemelytra long and narrow, a little obliquely rounded at tip, costal and sutural margins nearly straight .....G. 6. **Aphelonema**, Uhler.

Vertex subquadrate, deeply scooped out, anterior angles rectangular with bounding keels high, anterior margin arched in the centre; frons longer than wide, sides convexly curved, middle keel extends $2\frac{1}{3}$ its length downwards. Pronotum acutely triangular, extending forward almost to front line of eyes, deeply emarginated behind. Hemelytra long and narrow, vitreous, hispid, regularly parabolic on the costal margin, from the base to the inner apical angle, the inner margin straight; field with a net-work of large rounded areoles; costal area obliterated . . . . . G. 7. **Dictyonissus**, Uhler.

Abdomen distinctly compressed; costa remote from the margin; anterior tibiæ longer than the femora and trochanters together. . . G. 8. **Tylana**, Stäl.

3 Costa occupying the same margin, beneath anteriorly or before the middle, dilated; posterior tibiæ with one spine . . . . . G. 9. **Mycterodus**, Spinola.

4 Wings tailed, apical angle of the commissural produced, slightly curving upwards; clavus not attaining the apex of the wing. Costa dilated, remote from the margin, dilated part with transverse veins, not inflexed; posterior tibiæ with two spines ....G. 10. **Conosimus**, Mulsant.

Vertex before the eyes, produced.

Wings very much shortened, truncated ; frontal disk largely elevated ; thorax anteriorly produced beyond the middle of the eyes..... .....
G. 11. **Peltonotus**, Mulsant.

Wings oblong, apex extending somewhat beyond the abdomen ; frontal disk not or very slightly elevated ; thorax produced to the middle of the eyes .....
G. 12. **Ommatiotus**, Spinola.

Vertex before the eyes, not prominent ; body cylindrical ; wings much shorter than abdomen.

Frons and vertex forming an obtuse angle, very gradually produced towards apex ; clypeus large, towards the horizontal portion largely inflexed. ....
G. 13. **Bruchomorpha**, Newman.

Frons prolonged, globularly enlarged at apex..... G. 14. **Naso**, Fitch.

Subfamily V. **CALOSCELINÆ.**

TABLE OF GENERA.

Posterior tibiæ with more than three spines, multispinous.....2.

Posterior tibiæ with not more than three spines.

Anterior legs strongly dilated, foliaceous.

Posterior tibiæ with one spine .....G. 1. **Caloscelis**, Laporte.

Posterior tibiæ with three spines.

Lateral margins of vertex dilated, elevated..... .....
G. 2. **Elasmoscelis**, Spinola.

Lateral margins of vertex not dilated, not elevated .....
G. 3. **Lacusa**, Stäl.

Anterior femora and tibiæ somewhat dilated.

Head before the eyes prominent ; frons elevated, compressed ; posterior tibiæ with two spines.....G. 4. **Lophops**, Spinola.

2 Clypeus much longer than its breadth at base ; legs long or somewhat lengthened.

Head with a very distinct callosity behind the eyes ; anterior femora and tibiæ slightly compressed, dilated..... ... .G. 5. **Almana**, Stäl.

Head without or scarcely with a callosity behind the eyes ; anterior femora alone compressed, body broadly oval ; head somewhat triangularly produced....
G. 6. **Orgerius**, Stäl.

Clypeus a little longer than its breadth at base, legs short, anterior legs compressed .....G. 7. **Risius**, Stäl.

[TO BE CONTINUED.]

Change of Name.

In Proc. Cal. Acad., 2nd Series, Vol. 1, issued June 5th, 1888, I described a new genus and species of N. A. Scarabæidæ under the name of *Anoplognatho Dunnianus* but now finding this to be already in use I desire to substitute that of *Aphonides Dunniana.* J. J. Rivers.

University of California, Oct. 23, 1888.

A New Species of Euphanessa.

By Annie Trumbull Slosson.

Euphanessa meridiana, n. sp.

I have been familiar for two or three years, in South Florida, with the insect to which I give the above name. I thought, at first, that it might be merely a southern variety of *E. mendica*, Walk., but am now confident, after careful study and comparison, that it is a different species. It is uniformly smaller than *mendica*, none of my specimens exceeding .9 inch in expanse. The anterior wings are longer and narrower proportionately than in *mendica*, outer margin more oblique, and they are of a deeper ochreous tint, sometimes almost orange. The two rows of dusky, semi-transparent spots are quite different in appearance and arrangement. The outer row is composed of very small separate spots, which never coalesce; it is a mere dotted line, very regular in its course, with none of the blotchy unevenness of the same line in *mendica*. The inner row has only three spots, a large one in discal cell, and two much smaller, which are nearer the base and inner margin. Secondaries concolorous and immaculate. My description is comparative, rather than scientific, but will, I think, serve to identify the insect for all who know our common northern species. I have found this moth at Charlotte Harbor, Tampa, and Winter Park, but no farther north. I know nothing as yet of the larva.

Note on Zeuzera pyrina.

By A. R. Grote.

In reference to Mr. Graef's interesting article (Ento. Americana, Vol. IV, p. 162) I would state that I did not include *Zeuzera æsculi (pyrina)* in my list, because I believed its occurence to be quite accidental. I believe *æsculi* and *pyrina* to be synonyms for the European species. With regard to *canadensis*, I do not think, from Herrich-Schäffer's figure, that it is a *Zeuzera*; certainly it is not *æsculi*. I have never seen the species. It is not yet certain that *æsculi* breeds in North America. The specimens observed may have been imported, as larvæ or pupæ, in wood. If it were indigenous to North America it would surely have been taken before this; the fact, that in Morris' Synopsis, *pyrina* is credited to North America, is probably due to an original mistake in the habitat. I have alluded elsewhere to the chance finding of a specimen of *æsculi* in Hoboken and I thought at the time, that it must

have been imported, either purposely or accidentally. The question is now, whether *æsculi* breeds with us, as for instance the Asiatic *Philosamia cynthia* does. Whichever way this question is answered I am disposed to believe that its occurrence in North America originally will be found to be due to a comparatively recent importation.

EDITOR OF ENTOMOLOGICA AMERICANA.

DEAR SIR:—After a knowledge of Mr. Grote's criticisms of my location of my genus *Cerathosia*, in ENTO. AM., and afterwards in the CAN. ENTO., I sent a specimen of the species to Mr. H. B. Moeschler, the well-known European Lepidopterist, requesting him to give me, for publication, his opinion of the family location of the genus. Mr. Moeschler writes me under date Sept. 28th,—"To-day I received the parcel containing the two moths. I have examined them and, there is no doubt, you are right; this species belongs to the *Arctiidæ*, as the costal nervule is not derived from the base of the hind wings, but from the discoidal cell; this characteristic separating the *Arctiidæ* and *Lithosiidæ* from the *Noctuidæ*, which have this nervule derived from the base of the wing, only a little connected with the fore edge of the cell. I do not doubt this species is an *Arctiid* nearly allied to *Deiopeia* and *Emydia*."

Under date Sept. 30th, Mr. Moeschler again wrote me:—"I received ENTO. AMERICANA, No. 6, to-day, and it was with great interest I read yours and Mr. Grote's paper on *Cerathosia tricolor*, SM. If Mr. Grote had looked into 'Lederer's Noctuinen Europa's,' he could read, page 2, 'sie (die *Noctuinen*) unterscheiden sich von den *Lithosiden* (incl. *Nola*, *Sarrothripa* und *Nycteoli*,) und *Arctiiden* durch die bei diesen aus der Mitte oder $^{9}/_{3}$ des Vorderrandes der Mittelzelle entspringenden Rippe 8 der Hinterflügel.' Mr. Grote would have spared much effort to prove something not existing, by reasons which are not of any value, if he had remembered the only important characteristic separating the *Lithosiidæ* and *Arctiidæ* from the *Noctuidæ*. I am much surprised that so distingu shed a writer as Mr. Grote, could omit so important a characteristic, but—the systematic position of the genera of the so-called *Zygænidæ* in h s New Check List, is sufficient to prove, that Mr. Grote's systematic views are sometimes more than singular!"—Seeing the specimens of *C. tricolor*, my first thought was, that it is a genus very closely allied to *Deiopeia* (*Utetheisa*) and *Emydia*, and I should have been much surprised if an exact examination had given another result."

So far as I am concerned, this closes the matter, except for the paper now in the hands of the printer, for the Proc. U. S. National Museum.

Washington, D. C., Oct. 18, 1888. JOHN B. SMITH.

ON NORTH AMERICAN TINEIDÆ.

By Wm. Beutenmüller.

Tinea seminolella, n. sp.

Head, thorax and palpi, deep fuscous. Primaries, fuscous, covered with deep fuscous scales, without any markings, except an indistinct blackish discal spot with a paler margin. Legs, body, secondaries and wings beneath, fuscous.

Expanse, 17 mm.

1 ♀. Coll. W. B. Hab.—Central Florida.

Acrolophus plumifrontellus, Clem.

The undescribed ♀ of this species differs from the ♂ only in having long porrected labial palpi, and the markings of the primaries much suffused with the ground color. Expanse, 19 mm. Length of palpi, 5 mm.

1 example. Coll. W. B Taken at Parkville, L. I., N. Y., July, 1888. Another specimen, much larger than the one I possess, is in the collection of Mrs. A. T. Slosson, taken in the White Mountains, N. H.

Psecadia albicostella, n. sp.

Head white, with a black spot on the vertex ; palpi black, second and third joints tipped with white, thorax ochreous fuscous with two black spots, one on each side about the middle ; tegulæ tipped with white. Body ochreous, tuft orange yellow. Primaries ochreous fuscous with a median, scaly, white basal streak, running to the apical third. Beyond this streak is a small black spot and one at the basal third of the wing below the fold. Extreme costa and cilia white. Before the apex on the costa are four small black spots and seven on the margin. Secondaries and underside of wings, ochreous fuscous. Expanse, 22 mm.

1 ♂. Coll. W. B. Hab.—Colorado.

Psecadia walsinghamella, n. sp.

Head white ; palpi white ; first and second joint with a black ring at the base ; third with a black ring before the tip. Antennæ fuscous. Thorax white with four black spots. Body and legs ochreous. Primaries pure white, shining, with a number of black spots and four long black streaks ; one at the base below the costa ; one a little below and beyond ; one in the cell ; and one above and beyond nearly reaching the outer margin about the middle ; at the end of the discal cell a small black spot and one below and beyond ; below the fold are three spots ; one about the basal fourth ; one before the middle and one below and between the two ; on the fold at the base of the wing a small spot. Above the long streaks through the middle of the wing beyond the basal one are a number of black subcostal spots, and on the costa before the apex a series of small spots running along the margin to the inner angle. Cilia white. Primaries beneath, fuscous, shining. Expanse, 21 mm.

1 ♂. Coll. W. B. Hab.—West Virginia.

Named in honor of Lord Walsingham, who has contributed much to the knowledge of American *Tineidæ*.

Psecadia semilugens, Zell., *var.* **plumbeella**, n. var.

This form can be distinguished from the type by the lead colored secondaries and dorsal half of the primaries. Expanse, 20 mm.

1 ♂. Coll. W. B. Hab.—Texas.

Depressaria curvilineella, n. sp.

Head white, thorax and legs grayish ochreous. Primaries gray, thickly clouded with grayish ochreous scales, especially at the base beyond the pale basal field which extends to the costal third; on the disk before the middle of the wing is a curved black streak and a little beyond a small white spot edged with black; costa sprinkled with fuscous scales. Cilia grayish ochreous. Secondaries gray fuscous; cilia white. Underside of primaries fuscous; costa and cilia white. Secondaries paler than above with four apical black spots. Expanse, 18 mm.

1 example Coll. W. B. Hab.—New York.

Graciaria fuscoochrella, n. sp.

Head and palpi ochreous; legs ochreous annulated with fuscous; thorax and antennæ fuscous. Primaries and secondaries fuscous, as also the underside of all the wings. Expanse, 14 mm.

1 example. Coll. W. B. Hab.—California.

Cosmopteryx floridanella, n. sp.

Head olive brown with three fine white stripes; one on the middle and one on each side behind the eyes. These stripes are continuous with the three on the thorax which is also olive brown. Face silvery ochreous, as are also the palpi, underside of thorax and body; legs annulated with brown. Body above olive brown, in some lights yellowish ochreous. Primaries olive brown with three silvery white basal streaks: one on the subcosta, one on the dorsal margin and one above the fold; all running to about the basal third. Between the two latter streaks is another, beginning about the basal fourth and reaching the broad, pale yellow transverse patch beyond the middle of the wing; at the internal portion of the band below the costa is a small black margined metallic silvery spot and a larger one below and beyond; the external margin of the band is limited by a narrow transverse metallic silvery band, about the middle of which commences a narrow white streak running to the extreme apex of the wing. Secondaries grayish. Cilia olivaceous, as is also the underside of the wings. Expanse, 9 mm.

1 ♀. Coll. W. B. Hab.—Central Florida, May, 1887.

Cosmopteryx minutella, n. sp.

Head deep brown with three fine white stripes; (scales abraded on the thorax); palpi white with a few brown scales; legs ochreous annulated with brown. Primaries deep brown with two fine white basal streaks; one running along the costa for a short distance, then gradually bending downward and running along the subcosta to about the basal third; the second streak runs along the fold to nearly the middle of the wing; a third white streak begins below the fold about the basal third and becomes orange yellow as it reaches the very broad transverse band of the same hue; on the internal margin of the band are two violet-hued silvery spots; the one below the costa is limited by a conspicuous black discal spot; before the external margin of the band which is prolonged into an angle, is a costal and dorsal, violet-hued silvery spot; beginning at the angle of the band is a fine white stripe reaching the extreme apex of the wing. Secondaries and wings beneath fuscous. Expanse, 7 mm.

1 ♂. Coll. W. B. Hab.—Central Florida.

Some Studies of the Development of Lixus concavus, *Say*, and L. macer, *Leconte*.

By F. M. Webster.

Concerning the habits and transformations of the twenty-five species of the genus *Lixus*, inhabiting North America, North of Mexico, very little appears to have been learned; the limited information we possess relating exclusively to but three species.

From the fact that adults of *Lixus rubellus*, Rand, have, on two occasions, been observed in considerable numbers clinging to the blossoms and leaves of an aquatic plant, *Polygonum amphibium*, this insect is suspected of infesting that plant, the theory being strengthened somewhat by the fact that *L. paraplecticus*, an European species, breeds in the stems of *Sium*, or Water Parsnip. (Rep't Com. Agr., 1870, p. 71.) The larvæ of another European species, *L. angustatus*, is said to mine in the stalks of beans.

Lixus parcus, a native of California, is said by Prof. Riley to form galls in the stems of *Amelanchier*. (Proc. Ent. Soc. Wash., Vol. I, p. 33.)

A single short notice, printed in 1866, by Mr. Townend Glover, contains all the published information we have respecting the life-history of *concavus*. Mr. Glover states that he observed the female beetle "burrowing into the foot-stalks of rhubarb, or pie-plant, and there depositing a single egg in each hole." The observer failed to rear the young, however, as the latter died in a few days, as soon as the stalks became withered. (Rep't Com. Agr., 1865, p. 90.)

Of the early stages of *macer*, we likewise have but little published information. Prof. Riley reared it in 1872 from *Chenopodium hybridum*, but the girdling habit of the larvæ was not observed by him. (Loc. Cit.) Mr. D. W. Coquillett, in a short article published in 1883, (Can. Ent., Vol. XV, p. 113), states that on July 13th, 1881, near Woodstock, McHenry County, Illinois, he observed a female of this species busily engaged in gnawing holes in the stems of a green *Helianthus grosseserratus*, or Wild Sun-flower. There were several holes in the stem, and in each he found one or two eggs, of an elliptic-ovoid form, polished, pale yellow, and measuring about two and one-fourth mm. in length. In the stems of other similar weeds growing near by, he found several recently hatched larvæ. Stems of the same species of weed were examined during the Summer, and larvæ in different stages of their growth were observed, sometimes two or three in the same plant. Late in October, pieces of these stems, from one and a half to three feet long, were found lying about on the ground, evidently having been gnawed off from within, excepting

the thin, outer bark, which had apparently been broken by the wind. These pieces contained a larva, evidently of the same species as those previously observed; and similar larvæ, but no pupæ, were observed in the prostrate stems, on the 25th of the following April. From these observations, Mr. Coquillett opined that the beetles deposited their eggs in mid summer; the larvæ, hatching in a few days, reached their full growth in three or four months, and, hibernating in the stems in that stage, changed to pupæ early the following Summer, emerging as adults soon after.

At the time Mr. Coquillett was making these observations, we, in an adjoining County of the same State, were similarly engaged, although as ignorant of his studies as he was of ours. However, with the exception of securing more facts relative to the mode of oviposition, and the number of eggs, and the grouping of the egg chambers, we did not materially improve upon his observations, as afterwards published.

In Northern Illinois, where we always found *macer* to be the most common species of *Lixus*, *concavus* seldom occured in our collections. In Central Illinois, in 1882 and 1883, we found the latter to be the more abundant species, while the former was seldom observed. We were more surprised to here observe *concavus* ovipositing in the stems of *Helianthus*, exactly as we had observed its congener do in the Northern part of the State.

The female, of either species, in depositing her eggs, first places herself, head downward, upon the stalk in which she intends to oviposit, and, without moving the feet, commences a series of backward and forward movements of the rostrum, gouging out a narrow channel, varying from three-fourths to about an inch in length, penetrating through the woody portion of the stem to the pith. This channel is not clean cut, but is, when finished, filled with matted fibre, not detached and not easily removed. From near the upper end of this channel, the female next excavates a burrow, of the diameter of her rostrum, directly into the pith, for a considerable distance; thence upward as far as she can reach. While we have never observed the sexes *in coitu*, nor the placing of the egg, the male is almost invariably present *in situ*, and we have often interrupted the female in the midst of her work, and found an egg partly in place in the stem. These observations leave little room for doubt that the eggs are fecundated just prior to the act of oviposition, and dropped by the female at the mouth of the burrow, being afterwards pushed in place by aid of her rostrum.

Wherever there was good evidence of the nidus having been completed, we have always found a second chamber or burrow, at the lower extremity of the channel also, but not extending far enough upward to come in contact with the upper. In each of these chambers we have

always found two eggs; the first at the upper extremity, and fastened by some adhesive substance on the egg itself. Back of this egg, a piece of pith seems to be shoved in, to aid in holding it in place, and to hold it from the second egg, which is placed directly behind this, and frequently, but not always, a piece of pith is placed behind the latter also. While it might be too much to say that the invariable number of eggs is two, in each chamber, and that there are always two chambers connected with each channel, with a single exception we have found this to be the case. In the exceptional case, there was a channel fully twice the ordinary length, and four chambers connected with it; the second and third, however, being much more distantly placed than the first from the second, or the third from the fourth. Just why so much method should be followed in this arrangement, it is difficult to understand. Possibly the female may comprehend that were she to place herself in a reverse position on the plant, the chambers would extend downward and a drop of water or dew, on its way downward on the outside of the stem, might penetrate the latter and destroy the eggs, the young larvæ, or even the entire plant. As it is, the chamber extends upward, and, besides, the gum, which exudes from the plant, collects in the mass of fibres in the channel, and as this gum hardens it tends to seal the whole entrance. The secret of the number of egg chambers, per each channel, may lie in that the latter is as long as the female can make it without changing her position, as, with the weight of the male added to her own, moving about would prove too laborious. With two eggs in each chamber, there need be no conflict among the young larvæ, as one can work upward and the other downward; the only chance for a conflict here being, that the lower one of the upper chamber might come in contact with the uppermost larvæ of the lower chamber. They are certainly not quarrelsome, however, as we have taken thirteen full grown larvæ from a section of *Helianthus* only about as many inches in length.

The egg of *Lixus concavus* is oblong-oval, smooth, of a very light yellow color, 1.5 mm. long, and 1 mm. in diameter.

As to the time required for these eggs to hatch, after being deposited, I have no exact data, but think Mr. Coquillett's opinion respecting those of *L. macer*, would apply to *concavus* also, as my own observations indicate that the period covers only a few days.

In the latitude of LaFayette, Indiana, the eggs are deposited during July and early in August, the larvæ becoming full grown by the 20th of October. In the stems of the plant, these larvæ are rather contracted, and remain, when quiet, in a somewhat curved position, being then only about 18 mm. in length.

The extended larva is 21 to 23 mm. long, of a nearly white color; head, smaller than first segment of body, somewhat oblong, slightly narrowed anteriorly, brown, with inverted Y mark, and sutures at base of mandibles, white; at the juncture of the two branches of the Y mark, is a crescent shaped, white space, thickly blotched with brown; the concave side of this space is downward, and the branches of the Y mark, in a measure, form its outline; front depressed between branches of Y mark with a narrow, straight dark line, extending from their confluence to near frontal suture, lower margin strongly ridged. On each side of this dark line are three setigerous depressions, and there are several longer setæ on the sides and vertex. Antennæ rudimentary. Just above each of these is a setigerous puncture, and again just above these is a small semi-translucent spot. Eyes wanting. Mouth parts, light brown; mandibles darker, stout, concave on inner side, bifid at tip, the lower portion being shorter and more curved, with a small, broad tooth on inner margin. Body, wrinkled, increasing from head to third segment, then decreasing to fifth, sixth to eighth equal, ninth larger, tenth still larger, eleventh smaller, twelfth much smaller, sub-convex and cyperform behind, with anal aperture in center of disc. The first ten segments are divided above by two transverse wrinkles, forming two long and one short transverse folds on each, the latter being placed anteriorly. The eleventh segment has but one wrinkle, and the twelfth none at all. The first segment is larger than the head, with light brown patch resembling a cervical shield, which is divided by a median, lineal white line, and, bearing on front and posterior margins, a transverse row of short bristles. There is also a cluster of four bristles at each end of the cervical shield, and between it and the spiracle; on the second fold are two, small, light brown patches, divided by a dorsal, white line, each patch bearing a single bristle. The second segment has also a transverse row of bristles, and besides there is also one placed singly on each side of a slight, medial depression. Segments three to eighth with similar row of small bristles only, the ninth having a single bristle on each side of the fold near the middle of the back. The tenth segment has a row of larger bristles, and two on each side of fold. On the eleventh, the bristles are still longer, and inclined to form clusters at the sides, near the spiracles. On twelfth segment, the bristles form a semi-circular cluster. On each segment, except the second and twelfth, is a double row of obtuse, yellowish pustules, placed just below the spiracles, each bearing a few, short, scattering bristles. Between these rows of pustules is a deep, lateral groove, and, where this crosses the segmental wrinkle, a deep, quadrangular fossa is produced.

Beneath, the feet are wanting, and their place supplied by pust-

ules, upon each of which are eighth ambulatory setæ, one of the number being somewhat isolated and near the middle of the segment. On all twelve segments are four, short setæ, placed in pairs each side of the middle ; those on the thoracic segments being between the isolated setæ, just indicated.

The pupæ average 16 mm. in length. In the female, the rostrum reaches considerably beyond the base of anterior femora, while in the male it extends very little beyond. On the rostrum, head and thorax are a few, sparsely placed bristles.

Beneath, the nine segments are smooth, distinctly separated, and with a few short bristles. Above, the first segment is smooth, with exception of the scutellar turbucle; the second is smooth, but on the third, fourth and fifth, each, is a transverse row of fleshy spines, ending with chitinous points, and placed near the posterior margins of the segments. On the sixth, the spines are larger and almost dactyliform, being placed on a transverse, fleshy ridge. On the seventh segment, this ridge assumes a comb-like appearance, and is divided at middle, and on each of the parts thus constituted are five fleshy spines, all much larger and longer than any on the preceeding segments. The eighth segment is nearly vertical, unarmed, but slightly wrinkled and conspicuously setigerous. The ninth segment is nearly horizontal below and opposite the eighth, or curled under, as it may be called. This is armed with two, widely separated proleg-like appendages, each terminating in a stout, chitinous hook, with the point turned directly backward. Abdomen, slightly broadest at third and fourth segments. The spines above described are doubtless to enable the pupa to push itself into a position favorable to the escape of the adult, which, within the stems of the plants, must be well nigh helpless.

When full grown, the larvæ girdle the stems from within, at irregular intervals, much as does the larvæ of *Elaphidion* within the twigs of oak, hickory and other trees, except that only the thin outer bark is left intact, to be broken off by the winds ; the object being to give the larva time to withdraw into its burrow and plug up the opening. In proof of this the ends of the stems are filled with fibrous matter, taken from within the stem. Doubtless this girdling is done during a calm time, else the wind would surprise the larva with its work but half finished, but how it obtains a knowledge of the state of the weather outside, is a problem.

Notwithstanding all their precautions in filling the cavities at the ends of the stems, they are far from safe in their woody abodes, as, while protecting them from enemies of their own kind, even the thick

walls are no protection from the cruel beak of the wood-pecker, and hundreds of these larvæ are dragged from their Winter-quarters to satisfy the insatiable greed of these birds.

The stems of the plant are not girdled by the larvæ until the former are quite dead, and hence, the plant is not materially affected, and sections are not to be found scattered about on the ground much before October.

As a rule, *concavus*, and probably *macer* also, hibernate in the larval stage, but the former, at least, sometimes live over in the adult stage, as we have elsewhere shown to be true of another species of *Curculionidæ* (Rep't Com. Agr., 1886,), whose transformations are quite similar in point of time. I have found adults of *concavus*, on December 4th, and again in April of the following year, while in May I could find only larvæ. I have found healthy larvæ in stems dug out of ice and frozen snow in January, and found them during the four months following, but have never been able to ascertain the time required in which to pass the pupæ stage, or the exact season during which this takes place, but opine that it will prove to be late in May and during June. My examples of the pupæ were from stems containing larvæ, kept in-doors. These transformed in January, and the pupæ period occupied only a few days.

I have found larvæ only in *Helianthus* and have repeatedly observed the adults feeding upon the foliage. In a single instance I observed a female ovipositing in *Silphium*, or Rosin weed, and it is quite probable that they may be found in the stems of other, similar plants, besides *Chenopodium*, as observed by Prof. Riley.

I have not studied the larvæ of *macer* enough to find a ready distinction between them and *concavus*. They are usually more slender and less wrinkled, but it is doubtful if this holds true in all classes. The pupæ are more slender, and the rostrum and anterior femora are much longer, and these afford a good basis of separation.

The knowledge which I have obtained regarding the habits of both these species, would indicate a closer relationship between the two, than now accorded them, but much more remains to be learned of their habits in other localities, and, especially where both are common, if such a place can be found, before the question of relationship can be satisfactorily settled; and it is with a hope of inciting such researches that these notes are given.

Notes upon the Habit of Pleocoma.

By J. J. Rivers.
(University of California.)

It is known that the autumn rain, when copious, makes the *Pleocoma* season and during the latter part of last week from the 14th to the 17th of November there was a rain-fall of five inches. The 18th was a fine *Pleocoma* day with warmth and sunshine. I visited well-known haunts of *P. Behrensi* but without reward. I found some burrows that had the correct look of a beetle tunnel but my tools were unequal to a proper investigation. The same day, meeting a friend, I was informed he had a "bug" for me that was drowned in a pool, formed by the heavy rain. This proved to be a large male of *P. Behrensi*. Mr. Oscar Baron found that *P. fimbriata* took wing in the rain, which observation is new. The late Dr. J. L. Leconte, in a letter some years ago, told me to try for the capture of *Pleocoma* by the means of artificial light in the night time. This method was not credited by some of my confreres because the general experience had been to find them flying in the day time and usually on the first fine day following the first heavy rain of the season. But the experience of Mr. Oscar Baron again steps in and corroborates Dr. J. L. Leconte's account of the habit of flying by night. Mr. Baron occupied a tent during a rain-storm in November, 1887, and while taking his evening meal was surprised by a visitation of a number of *P. fimbriata* entering his tent, charging upon his light and extinguishing it and then falling into his soup—thus becoming an unruly visitor.

These observations go to show that the habit of *Pleocoma* is not strictly diurnal, nor is it nocturnal, but that their habit is to travel both by day and night and that, too, either in the sunshine or in the rain.

November 21st, 1888.

A New Pleocoma.

By J. J. Rivers.
(University of California.)

This insect through the form of its antennæ shows a special affinity with two others of the genus and these three possessing fundamental correlated characters naturally come together as as a specialised section. The three referred to are *P. Rickseckeri*, *P. fimbriata* and the one now to be described. The new one is most like *P. Rickseckeri*.

Pleocoma puncticollis, n. sp.

Broadly oval, shining black, fimbriate with long black hair, having a tendency to rustiness. Head small, eyes large, clypeal horn reflexed bifurcate or deeply

emarginate, the apices being obtuse: vertex with horn only impressed at tip and scarcely emarginate, face of horn flat and granulated; genæ have the front margins straight with their apices obtuse or truncate. Antennæ stouter than in the allies, the 3rd joint being longer than the 4th and 5th combined, the 6th transverse, compressed on the upper part from which proceed several short setæ, the 7th joint transverse with longer and more numerous setæ, the 8th joint shorter and much narrower than the 11th, the 9th and 10th being nearly equal and longest. The color of the lamellate portion dull brown. Thorax twice as wide as long and wider than the elytra at their juncture; hind angles prominent, sides arcuate, front angles rounded; on the front margin originates a median channel intercepted by a bold swelling on the discal area; there are also slight depressions at the side and front margins; the whole area of the thorax is coarsely and closely punctured (almost rugosely punctate). Elytra of the usual form but the whole surface is smooth and shining, the geminate striæ being represented by rows of punctures at wide intervals and the general sculpture is of the faintest kind. The legs and abdominal surface clothed with long black hair, having a slight rustiness of tone. One specimen. Length, 26 mm.

Collected in November by G. W. Dunn in the Cuyamaca Mts., 8 miles from Julian, Cal.

P. puncticollis differs from *P. Rickseckeri* by the former being heavily punctured all over the disc of the thorax, while in the latter the same part is sparsely and lightly punctured; there is also the same amount of difference between the sculpturing of the elytra of the two but inversely, the surfaces of *P. puncticollis* being smooth while in *P. Rickseckeri* they are ornamented with wrinkled elevations.

North American Microlepidoptera.

By Prof. C. H. Fernald.
(Amherst, Mass.)

Tortrix citrana, n. sp.

Expanse of wings, 20 mm. Head, palpi, thorax and fore wings, cinnamon brown, varying somewhat in different specimens. The palpi are porrect, compressed laterally, and the last joint is short and blunt. The thorax has a very small tuft behind which is tipped with ferruginous. The fore wings are crossed by an oblique, dark brown band which arises from the middle of the costa and the outer edge ends near the anal angle while the inner side becomes diffuse and shades the basal portion of the wing below the subcostal more or less completely. A triangular brown spot rests on the outer fourth of the costa. The surface of the wing, when viewed obliquely appears to be crossed by a large series of irregular stripes of lead-colored scales. The terminal line is dark brown when present, and the fringes are cinnamon brown. Hind wings white, tinged with steel-gray on the anal portion. Underside of the body and wings, pale yellowish.

Bred from Orange in California, by Mr. Coquillett. I have also seen one from the leaves of Solidago and one from Willow, all from California.

Book Notice.

An Introduction to Entomology, By JOHN HENRY COMSTOCK, Ithaca, N. Y., 1888. Published by the author. Part I, pp. I to VI and 1 to 234, ff. 201.

This book, so far as it goes, fills one of the spaces so long left vacant by American writers. It presents in a form, suitable for use in the class-room, the essential parts of Insect Anatomy and even goes further, and lays the basis for an ability to continue independant and original observation. Not only to the student in the class-room is it valuable however—it had missed a large field of usefulness else—but also to the enterprising young man or boy with an intense longing to know something about general Insect structure, but without money to buy a library or access to any large Public Library. So far as it goes, it comprises Chapters on the Anatomy and Metamorphoses of Insects, the general or Ordinal Classification, and the Classification of the *Thysanura*, *Pseudoneuroptera*. *Orthoptera*, *Physopoda*, *Hemiptera* and *Neuroptera*. The general plan throughout is to give at once a tabular or synoptic statement of the classification, and then in a somewhat more elaborate manner to define all the divisions so far as within the scope of the work. These synoptic or tabular statements constitute one of the most useful and unique portions of the work, and in this alone Prof. Comstock's book will be entitled to the highest commendation. It is really what it pretends to be,—an Introductory work, in which any one interested can obtain a knowledge of the general classification of Insects. The adoption of the more simple of the ordinal divisions, deserves commendation. The more, as the minute and complex divisions of some of our more modern Authors are sufficiently indicated. Taken as a whole, it is by far the most practical and generally useful work that has been published in America. But while thus emphatic and sincere in its praise, we cannot forbear to call attention to what we consider imperfections which can perhaps be obviated in the other parts of the work. The description of the anatomical details is somewhat unnecessarily dry : the subject might have been made somewhat more interesting and attractive to the individual student. A more serious objection is to the illustrations : some of the original drawings are undeniably poor. In some, even those showing anatomical details, the artist, by close line shading, has made the drawing very obscure, where the simple outline would not only have answered the purpose better but would have printed more clearly. The lettering and numbering of details are often indistinct where the greatest clearness would seem to be indicated. Few of the original illustrations are of a really high character. While we are glad to see that Prof. Comstock has very largely restricted the use of the

special terms (caudad, ventrad, &c.), proposed by Prof. Wilder, we think their omission in some of the cases where used would have been of decided advantage: for instance, on page 10, he says "The *genæ* or cheeks are the lateral portion of the epicranium, which are usually ventrad of the eyes and caudad of the mandibles." Would it not have been just as accurate, just as scientific, and much more intelligible to have located them *below* the eyes and *behind* the mandibles? We really cannot see the advantage of the unnecessary use of unusual and ultra-technical terms in an Introductory work. With these small faultfindings, we most heartily recommend the book to all students of Entomology, old or young.

Washington, D. C. JOHN B. SMITH.

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Ottawa Naturalist, April and June, 1888.
Review of Species of Pleocoma, by Dr. Geo. H. Horn.
Obs. on Corn Insects, by F. M. Webster.
Report on Insects of the Season in Iowa, by H. M. Osborn.
Journal Trenton Nat. Hist. Society, No. 3.
Journal of Cinn. Society of Nat. History, Vol. II, Nos. 2 and 3.
Canadian Naturalist, Vol. XX, Nos. 10 and 11.
Hawk Moths of North America, by A. R. Grote.
Le Naturaliste Canadienne, Vol. XVIII, No. 3.
Naturae novitates, Nos. 17 to 20.
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Horae Societatis Entomologicae Rossicae, Vol. XXI.
Bulletin de la Société entomologique Suisse, Vol. VIII, No. 1.
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Verhandlungen der Kaiserlich-Königlichen zoologisch-botanischen Gesellschaft in Wien, Vol. XXXVIII, Nos. 1 and 2.
Bulletin de la Société Imperiale des Naturalistes de Moscow, Nos. 1 and 2, 1888.

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Ottawa Naturalist, September and October, 1888.
Preliminary List of Myriapoda of Arkansas, by Chas. H. Bollman.
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Bulletin 2 and 4 of Experiment Station of College of Agriculture, University of Minnesota.
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R. T. PEARSALL, *Librarian.*

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A GENERIC SYNOPSIS OF THE FULGORIDÆ.

By Wm. H. Ashmead.

[Continued from p. 6.]

(Family II. FULGORIDÆ.)

Subfamily VI. DICTYOPHARINÆ.

TABLE OF GENERA.

Head as broad as the prothorax, arcuated before... ..G. 1. **Cladypha**, A. et S.

Head narrower than the prothorax.

Elytra with small and quadrangular cells of the same size; head rather small, rounded before..... .....G. 2. **Pterodictya**, Burm.

Elytra with forked nervures and elongated cells, less numerous at their basal half; head more or less prolonged beyond the eyes.

Elytra not separated into two parts by an elevated line.....2.

Elytra divided into two parts by an elevated, transverse line.:.....
G. 3. **Dichoptera**, Spinola.

2 Elytra with basal cells somewhat elongated beyond the middle, followed by three rows of very small cells, narrow and arranged in a concentric half circle.....
G. 4. **Lappida**, A. et S.

Elytra with the discoidal flap with an infinite number of anastomosing veins or ramifications, extending in all directions and distributing into an infinite number of cellules of different shape..... G. 5. **Plegmatoptera**, Spinola.

Elytra not having three rows of cells arranged in a concentric circle at their extremity.

Cephalic prolongation in a pointed or subcylindric cone; vertex narrow.....
G. 6. **Dictyophara**, Germar.

Cephalic prolongation but slightly longer than wide, rounded before; vertex large, flattened, facetted.....G. 7. **Monopsis**, Spinola.

Cephalic prolongation long and slender; head with a distinct callosity behind the eyes; vertex with the lateral margins slightly dilated.....
G. 8. **Scolops**, Germar.

Subfamily VII. **FULGORINÆ.**

TABLE OF GENERA.

Head with a cephalic prolongation.....3.
Head without a cephalic prolongation.
Head broad without a longitudinal keel on the vertex .....2.
Head very narrow with a longitudinal keel on the vertex.
Mesothorax with three regular longitudinal keels, of which the two lateral ones are curved and united at the anterior margin ; frons broad, feebly keeled..
G. 1. **Aphana**, Guer.
Mesothorax without keels ; elytra very large, one or more times longer than the body..... .....G. 2. **Phenax**, Germar.
2 Head cut straight before the eyes ; a spine above each eye ; frons nearly vertical with three distinct facets .... G. 3. **Hypæpa**, Stäl.
Head curved before ; no spine above the eyes.
Elytra opaque their whole length ; last dorsal segment not covering the extremity of the abdomen in the ♀ .....G. 4. **Piocera**, Laporte.
Elytra coriaceous at the base only, last dorsal segment covering the extremity of the abdomen in the ♀ .....G. 3. **Calyptoproctus**, Spinola.
Frons nearly horizontal, divided into three not very distinct facets ; second joint of antennæ spherical..... G. 6. **Homalocephala**, Spinola.
3 Cheeks without a spine or tubercle anteriorly.....4.
Cheeks with a spine or tubercle anteriorly.
Cephalic protuberance horizontally directed before, inflated and vesiculose.....
G. 7. **Laternaria**, Stäl.
Cephalic protuberance not at all inflated or vesiculose ; protuberance suddenly enlarged at its extremity.....G. 8. **Phrictus**, Spinola.
4 Vertex twice the breadth of the rounded eyes.
Protuberance insensibly narrowing from the base to the apex .....
G. 9. **Enchophora**, Spinola.
Vertex much broader than the eyes ; protuberance long, rounded or subtetragonal.
Cheeks at apex before the eyes truncated ; frons at apex slightly sinuate, with two or three longitudinal keels ; feet slender, scutellum slightly keeled ; protuberance more or less curved.....G. 10. **Fulgora**, Linn.
Cheeks at apex before the eyes rounded or subtruncately rounded ; frons at apex deeply sinuate ; scutellum not keeled ; protuberance straight.....
G. 11. **Pyrops**, Spinola.
Vertex very broad, both sides of frons at apex lobate, above the lobe upwards, more or less enlarged.
Fifth dorsal plate of the abdomen operculiform, forming a covering for the following segment.....G. 12. **Episcius**, Spinola.
Fifth dorsal plate of abdomen of ordinary form.....G. 13. **Dilobura**, Spinola.

Subfamily VIII. **CIXIINÆ.**

TABLE OF TRIBES.

A Ocelli 2 ; vein of clavus not reaching to the apex, or united with the commissural margin near the apex.
Last joint of the rostrum elongated, last joint of posterior tibiæ elongated.
Head narrower than the thorax.

Sides of clypeus keeled..... .....Tribe I. ACHILINI.
Sides of clypeus not keeled; thorax with three keels.....
Tribe II. TROPIDUCHINI.

Last joint of the rostrum short or very short.
Head sometimes not narrower than the thorax; thorax not keeled or with one obsolete keel.....Tribe III. DERBINI.

B Ocelli most frequently 3, the third ocellus on the apex of the frons and seldom wanting; vein of clavus reaching to the apex, or united with the suture of the clavus near the apex.....Tribe IV. CIXIINI.

Tribe I. ACHILINI.

TABLE OF GENERA.

Anterior tibiæ about equal to the femora and trochanters united, or somewhat shorter.
Posterior tibiæ with one spine or without spines.
Head and thorax of equal breadth .....G. 1. **Plectoderes**, Spinola.
Head narrower than the thorax.
Vertex short, transverse, not or scarcely prominent before the eyes, or confused with the frons; posterior tibiæ with one spine.
Vertex distinct, anterior margin obtusely rounded or angulated; thorax twice as broad as the head .....G. 2. **Achilus**, Kirby.
Vertex, before the eyes, distinctly produced.
Eyes subrotund, beneath scarcely sinuate; wings with elongate areas before the apical areas; frons narrowed upwards.....
G. 3. **Helicoptera**, A. et S.

Tribe II. TROPIDUCHINI.

TABLE OF GENERA.

Vertex truncate at base; thorax slightly and broadly roundedly sinuated at base..4.
Vertex emarginated at base; thorax posteriorly angularly emarginated.
Radial vein forked before the middle or near the base of the wings.....3.
Radial vein of wings simple or behind the middle of wings, or at least much longer at the base than the forked interior ulnar vein.
Wings oval, convex, horny, sprinkled with dense, depressed granules, obsoletely veined.....G. 1. **Grynia**, Stäl.
Wings membranous, distinctly veined.
Head depressed; frons subhorizontal; wings with a series of strongly oblique transverse veins, extending straight posteriorly and outwardly to the apex of the clavus ..... G. 2. **Tambina**, Stäl.
Frons more or less reclining, never horizontal; anterior tibiæ equal in length to the femora and trochanters united or somewhat shorter.
Lateral margins of clypeus distinctly keeled; veins of clavus united very much behind the middle..... ....2.
Lateral margins of clypeus obtuse, sometimes slightly keeled at base; wings extending much beyond apex of abdomen.
Wings with a double series of transverse veins toward apex, exterior ulnar vein simple.

Head short, somewhat prominent before the eyes ; vertex arcuate, very short ; frons not keeled, with two longitudinal impressions ; sides of clypeus slightly keeled at base ; veins of clavus united before the middle .....
G. 3. **Rudia**, Stäl.

Head moderately produced before the eyes ; vertex produced ; frons distinctly keeled ; costa remote from margin, sending out numerous transverse nervules..... ..... G. 4. **Numcia**, Stäl.

2 Anterior tibiæ somewhat longer than the femora and trochanters united ; head short, somewhat prominent before the eyes, obtuse ; frons somewhat convexly reflexed at base, also without a keel at base ; sides of clypeus obtusely subcarinated.

Head very slightly prominent before the eyes .. ... G. 5. **Clardea**, Signoret.

Head very much produced before the eyes .....G. 6. **Conchoptera**, Stäl.

Wings subelongated, scarcely enlarged toward apex ; frons with a median keel, obliterated towards the base .... G. 7. **Isporisa**, Stäl.

Wings toward apex gradually, greatly enlarged ; frons without a keel.....
G. 8. **Paricana**, Stäl.

3 Exterior margin of wing all greatly rounded ; radial vein forked nearer to the base than to the interior ulnar vein, emitting oblique branches .....
G. 9. **Alcestis**, Stäl.

Costal margin of wing scarcely or slightly rounded ; the radial and interior ulnar veins very much alike forked from base, without branches, costa remote from margin and emitting numerous transverse veins ; frons with one or three keels.

Head very greatly triangularly produced..... ..... G. 10. **Daradax**, Stäl.

Head slightly prominent before the eyes, obtuse....G. 11. **Tropiduchus**, Stäl.

4 Body broad, oval, depressed ; wings depressed, slightly horny, reaching somewhat beyond the apex of abdomen..... .....G. 12. **Gastrina**, Stäl.

Tribe III. DERBINI.

TABLE OF GENERA.

Head narrower than the thorax .....2.

Head and thorax of equal breadth .....G. 1. **Fescennia**, Stäl.

2 Antennæ with appendages at base ; last joint of rostrum twice longer than broad..
G. 2. **Otiocera**, Kirby.

Antennæ without appendages.

Second antennal joint oblong or elongated, apex with a sinus above.....3.

Second antennal joint of variable length, subglobose or elongated, apex without a sinus above.

Antennæ remote from clypeus, inserted close to the eyes or behind the inferior part of the cheeks.

Wings from within behind the clavus, dilated, rather long, obliquely roundedly truncate at apex ; clypeus somewhat longer than the frons, narrow, with keels ; scutellum with three keels.....G. 3. **Flaccia**, Stäl.

Wings from within behind the clavus not enlarged.

Head before the eyes strongly produced.....G. 4. **Persis**, Stäl.

Antennæ inserted on the inferior part of the cheeks near the clypeus.

Head before the eyes very slightly prominent, compressed.....
G. 5. **Phenice**, Westwood.

Head before the eyes greatly produced.....G. 6. **Halcita**, Stäl.

3 Wings very broad at the middle, narrowed behind the middle.
Second antennal joint suboblong or somewhat elongated.....
G. 7. **Mysidia**, Westwood.
Second antennal joint short, tuberculate with a dorsal seta.....
G. 8. **Ceuchrea**, Westwood.
Wings not so broad in the middle.
Second antennal joint elongated, sublinear, compressed, slightly obliquely truncate at apex, setigerous; head compressed, subtriangular, with two keels; frons subrostrate, rostrum straight; eyes prominent, sublunate.....
G. 9. **Anotia**, Kirby.

Tribe IV. CIXIINI.

TABLE OF GENERA.

Posterior tibiæ with one or three spines.
Head with three triangular or transversely quadrangular facets.....2.
Head without facets, prominent.
Vertex pentagonal, angularly grooved posteriorly or sinuately curved; frons almost a right angle, twice longer than wide, high at its apex.
Elytra enlarged behind the clavus, covering one another; posterior tibiæ with one small spine in the middle .....G. 1. **Cixidia**, Fieber.
Elytra of equal breadth, posteriorly rounded not dilated; posterior tibiæ with three spines.....G. 2. **Ommatissus**, Fieber.
2 Wings broadly triangular behind, trilobed at their exterior margin near the flexible suture .....G. 3. **Trirhacus**, Fieber.
Wings not lobed at their posterior border, feebly curved; pronotum strongly, subangularly incised posteriorly.
Mesonotum with three keels.....G. 4. **Cixius**, Latreille.
Mesonotum with five keels.
Vertex elongate pentagonal; frons with the median keel simple at apex; scutellum with the intermediate keel feeble; posterior tibiæ with two spines.....G. 5. **Hyalesthes**, Signoret.
Vertex more or less broadly pentagonal with sharp ridges; scutellum with all the keels distinct; posterior tibiæ with three spines.....
G. 6. **Oliarus**, Stäl.

Subfamily IX. **DELPHACINÆ**.

TABLE OF GENERA.

Antennæ of variable length, the second joint longer than the first.....2.
Antennæ long, first joint longer than the second.
First antennal joint compressed, somewhat dilated above and below.
Anterior legs dilated, foliaceous.....G. 1. **Asiraca**, Latreille.
Anterior legs not dilated, simple.
Head as broad as the thorax; antennæ and legs moderate.....
G. 2. **Areopus**, Spinola.
Head narrower than thorax; frons narrow, elongate, narrowed upwards; antennæ and legs long.....G. 3. **Sparnia**, Stäl.
First antennal joint, subcylindrical, not compressed; legs long, simple.....
G. 4. **Hapalomelus**, Stäl.
2 Antennæ greatly lengthened, dilated.....G. 5. **Copicerus**, Schwarz.
Antennæ simple, cylindrical or somewhat compressed.

Antennæ somewhat shortened, first joint short ....3.
Antennæ very long, first joint elongated.
Scutellum with 5 keels.
Anterior tibiæ longer than the femora and trochanters united.
Interior ulnar and radial veins of corium of equal length, forked at base.....
G. 6. **Hygyops**, A. et S.
Interior ulnar vein shorter than the radial, the latter forked at base.... ....
G. 7. **Canyra**, Stäl.
Anterior tibiæ as long as the femora.....G. 8. **Livatis**, Stäl.
3 Head broader than thorax ....G. 9. **Amblycotis**, Stäl.
Head narrower than thorax or of equal breadth.
Elytra convex... ..... G. 10. **Rhinotettix**, Stäl.
Elytra flat or somewhat flattened.
Posterior tarsi shorter than their tibiæ..... .....8.
Posterior tarsi as long as their tibiæ.
Side keels of pronotum oblique, shortened behind.....4.
Side keels of pronotum attaining the posterior margin, divergent; frons with a median keel.
Vertex a long isosceles triangle, without grooves or foveæ, with a median keel extending from one extremity to the other, prolonged beyond the eyes nearly half their length; clypeus with a median keel; basal antennal joint about one-third the length of second, thick, cylindrical; posterior tibiæ with two spines.....G. 11. **Tropidocephala**, Stäl.
Vertex elongated, quadrangular, more or less prolonged before the eyes; frons with a median keel biforked on the vertex; clypeus with a sharp median keel; basal antennal joint cylindrical, somewhat compressed, two-thirds the length of second which is cylindrical.....
G. 12. **Megamelus**, Fieber.
4 Frons with two distinct keels, or else feeble above or nearly effaced, or more or less longly peduncled toward clypeus.....6.
Frons with one distinct median keel, entire or shortened, often scarcely visible.
Frons with the apex of vertex forming an obtuse angle; vertex pentagonal, short, as long as wide at the base; pronotum short, half as long as wide at the base; pronotum short, half as long as the vertex with a median keel; side keels robust when with short elytra, feeble when with elytra well developed..... .....G. 13. **Delphacinus**, Fieber.
Frons at apex and vertex at apex, truncated; vertex quadrate or elongated nearly trapezoidal.
Vertex a short isosceles triangle, or transversely quadrangular slightly passing the eye .....5.
Vertex quadrangular, elongated or trapezoidal, twice as long as wide, passing nearly half or more than half its length before the eyes; first posterior tarsal joint much longer than 2 and 3 united, joints 1 and 2 deeply excised at the apex, their lobes straight.
Vertex elongated, trapezoidal, visibly wider at the nape of the neck than at the apex; frons elongated nearly hexagonal, widest about the middle or at the apical third.....G. 14. **Chlorion**, Fieber.
5 Frons with keel entire or forked only at the apex.....
G. 15. **Delphax**, Fabr. (= **Liburnia**, Stäl.)

Frons and vertex straight at the apex ; vertex quadrate ; elytra clear in their two forms, but also black or brown when they are short, sometimes fringed with white .....7.

6 Frons and vertex obtusely angular at apex, sides elevated at the base, pressed against the eyes at apex ; head seen from the side short, cone-shaped ; vertex before pentagonal ; body short and black, even as are the elytra which are coriaceous.

Frons with two sharp keels curved outwardly, approaching very close and converging at the apex, slightly separated from each other at the clypeus which is convex and without keels.....G. 16. **Jassidæus**, Fieber.

Frons with feeble traces of 2 keels, more distinct in the ♀, very rarely found in the ♂ ; clypeus convex with a short and feeble keel, sides keeled.....
G. 17. **Metropis**, Fieber.

7 Frons with the keel forked much before the vertex .....
G. 18. **Dicranotropis**, Fieber.

Frons with 2 sharp keels as far as the vertex parallel, afterwards coming together at the level of the clypeus.....G. 19. **Achorotele**, Fieber.

8 Frons with two distinct keels.... ....11.

Frons without a keel or only feeble traces of a keel ....10.

Frons with a distinct median keel.

Frons long, narrowed, much narrowed towards apex, sides generally curved outwardly, at the apex a sharp, biforked keel extending nearly to the angles of the nape of the neck, with an angular keel between the two branches ; wing nerves strong, prominent ; basal antennal joint short, almost as long as wide.....G. 20. **Stenocranus**, Fieber.

Frons elongated, nearly hexagonal, wider towards the inferior angles of the eyes, its apex ordinarily truncate, very rarely curved ; the median keel feeble, generaliy curved, sometimes straight, lost at the apex, again distinct on the vertex and forked towards the angles of the nape of the neck ; basal antennal joint short, a little longer than wide.....G. 21. **Kelisia**, Fieber.

Vertex short, an isosceles triangle or transversely triangular, slightly passing the eye... .....9.

Vertex elongated, quadrangular or trapezoidal, passing beyond the eyes, nearly, or more than half its length.

Vertex rectangular, not one and a half times as long as wide ; frons of nearly equal breadth between the eyes, a little narrower towards the apex and sinuated, about three times as long as wide at the clypeus ; median keel of frons sharp, forked before the apex to scarcely back of the middle of the vertex, shortened here by the angular projection and directed on the angle of the nape of the neck ; basal antennal joint cylindrical, more than twice as long as wide..... .....G. 22. **Euides**, Fieber.

9 Frons elongated, almost hexagonal, broader between the inferior angles of the eyes, towards the apex at the sides, short, towards the base at the sides, long, much narrower at the clypeus then at its apex which is straight, median keel sharp on the frons, which is smooth, forked before the apex, basal antennal joint short, thickened, compressed, prolonged to the middle of the cheek, slightly longer than half the length of the second ; the second joint seen from before broader at the base, slightly compressed, and with an elongated hump near its middle beneath, where there is a small groove at the prominent

border, superior part of joint narrower, cylindrical.....
G. 23. **Conomelus**, Fieber.

10 Frons rectangular, twice as long as wide, its sides smooth, somewhat emarginate; pronotum as long as the vertex with a sharp median keel; basal antennal joint long, cylindrical, reaching the extremity of the cheek, more than three quarters as long as the second, which is a little thicker, reaching to the extremity of the clypeal margins..... .....G. 24. **Kormus**, Fieber.

Frons elongated, almost hexagonal, broader at the middle, the sides feebly emarginated, sometimes nearly obtusely angular at the eyes, slightly more than twice as long as wide at the middle; pronotum visibly shorter than the vertex, posterior margin feebly grooved in an obtuse angle, the median keel feeble, the side keels distinct only at the base, obliquely curved around the eyes; basal antennal joint short, cylindrical, reaching almost to the middle of the cheek, thickened, about two-thirds the length of the second which is robust and slightly passes the frons.....G. 25. **Eurysa**, Fieber.

Subfamily X. **TETTIGOMETRINÆ.**

TABLE OF GENERA.

Vertex horizontal; frons obliquely directed, short; clypeus without keels and inserted in the extremity of the frons which is grooved, rounded.....
G. 1. **Tettigometra**, Latreille.

Notes on Zeuzera pyrina, *Fabr.*

By J. B. Angelman.

August 14th, 1887, I took at an electric light in Newark, N. J., three specimens of this insect. Previous to that time I had never seen a specimen of the insect taken in America, nor had it been taken so far as I could learn by any of the Newark collectors.

In 1888 I took the insect again. The first specimen was taken on June 14th, and I continued taking others at intervals up to as late as Sept. 27th. Altogether I took 45 males and 1 female. The latter was not taken at light as were the others but was found on the side-walk after it had been stepped on by some passer-by. I learn from various collectors that it was taken quite commonly this year at the electric lights, and extending over a considerable length of time.

We can from the above be assured of two things: 1st,—that *Zeuzera pyrina*, Fabr., is permanently settled with us and exists in considerable numbers and a considerable range of country about New York. 2nd,—its time of appearance varies very greatly as I took it off and on for a period of 106 days during the season of 1888.

A List of the BUPRESTIDÆ of New England.

By Frederick Blanchard.

The present list of all the species of *Buprestidæ* known to me to have been found in New England, at the same time includes a strictly local list, the species quoted from Massachusetts without any authority, having occured in the immediate vicinity of Lowell.

As bearing upon the local fauna it might be mentioned that the Black Spruce grows near Lowell only in cold swamps though generally distributed farther north and in more elevated localities in this State. The Poplar mentioned is probably always the *Populus tremuloides*, although the *P. grandidentata* is also credited to this locality.

Two Buprestides only, appear to frequent herbaceous plants in such a way as to indicate the probability of their breeding in them, namely, *Agrilus imbellis* and *Pachyscelus lævigatus*. It seems quite likely however that *Taphrocerus gracilis* may in this respect be classed with them.

It will be observed that some species are noted as occurring on Pitch Pines and at the same time as breeding in White Pines. Many adult species frequent and feed upon the needles of the former, sometimes in very considerable numbers, while the White Pine yields very few specimens of any kind in beating. I suspect that many species breed indifferently in both of the Pines mentioned.

1. *Chalcophora virginiensis*, Drury.—Appears in the middle of May through June and into July and again in the Fall frequenting Pitch Pines (*P. rigida*). A living specimen was dug from a White Pine (*P. strobus*) stump in July. Another specimen is marked as taken Oct. 17, Mass.
2. *C. liberta*, Germ.—Appears with the above. One specimen is dated Aug. 2. A pair were once found dead in a Pitch Pine stump under rather curious conditions. Their burrows approached each other obliquely and the two specimens were tightly wedged together at the junction of the burrows about an inch from the outer opening. Mass.
3. *C. fortis*, Lec.—N. H., Henshaw.
4. *Dicerca prolongata*, Lec.—On trunks of young Poplars and on Poplar logs in June. Mass., N. H.
5. *D. divaricata*, Say.—June, July. Appears to breed in various deciduous trees. It has been dug from Red Maple (*Acer rubrum*) and also from Poplar. Immature specimens have appeared in Sept. Mass., N. H.
6. *D. caudata*, Lec.—Frequents Alders and Red Birches and is known to me to breed in the latter (*Betula nigra*). It appears in May, June, August and September. Mass.

7. *D. pugionata*, Germ.—This species appears to be confined to the common Alder (*Alnus incanus*). It appears in May. On Aug. 8th specimens occured that were evidently just out. Mass. I presume all of these early appearing species make their first exit in the late Summer, or early Fall, and hibernate.
8. *D. lurida*, Fabr.—On Hickory trees and logs. July, Oct. Mass.
9. *D. asperata*, Lap. & Gory.—Jan. 20th under White Oak bark. April 4th under a stone. Aug. 15th. Very rare with me. Mass.
10. *D. tenebrosa*, Kirby. —On Spruce wood piles and logs. June. Mass. N. H. var. *chrysea*, Mels., N. H. Revision, Leconte.
11. *D. tuberculata*, Chev.—N. H. Two specimens have occurred indoors in Lowell, but I do not know of its breeding here.
12. *D. lugubris*, Lec.—One specimen, Mass. Henshaw collection.
13. *D. punctulata*, Sch.—On trunks and foliage of Pitch Pines. Appears early in Spring and late in the Fall in warm days, and in one instance was found in mid-winter when the ground was covered deeply with snow. Mass.
14. *Pœcilonota cyanipes*, Say.—One specimen on the trunk of a Poplar. June. Mass.
15. *Buprestis lineata*, Fabr.—Both spotted and striped specimens on Pitch Pines in July. A specimen was dug from a White Pine stump. Mass.
16. *B. consularis*, Gory.—On Pitch Pines. July and Aug. Mass.
17. *B. Nuttalli*, Kirby.—Brookline, Mass. Henshaw.
18. *B. maculiventris*, Say.—Spruce wood piles and logs. Mass., N. H. Rare here.
19. *B. fasciata*. Fabr.—N. H.
20. *B. sulcicollis*, Lec.—N. H. One specimen on a Pitch Pine. May 30th. Maine, Henshaw.
21. *B. striata*, Fabr.—Two specimens dug from a White Pine stump May 4th. It has also appeared in June, but is rare with me. Mass. All the specimens seen from this locality are dull colored with the exception of one individual which was taken in Lowell as it emerged from a White Pine window sill just as the sash was raised. The timber thus inhabited was probably western.
22. *B. ultramarina*, Say.—Very rare. Beaten from Pitch Pines in May. One specimen was split from a Pitch Pine knot. Mass.
23. *Cinyra gracilipes*, Mels—Two specimens were taken on the shady side of a White Oak trunk in hot weather, Aug. 8. Mass.
24. *Melanophila longipes*, Say.—Found here only about buildings and is probably introduced in northern lumber. May, Aug. Mass.
25. *M. Drummondi*, Kirby.—Abundant on Spruce logs and about

Spruce wood piles (*Abies nigra*). N. H., Mass. A bright blue-green form of larger size considered by Dr. Horn as a var. of this species occurred at a considerable elevation on Mt. Washington on a freshly peeled Fir or White Spruce (*A. balsamea* or *alba*).

26. *M. fulvoguttata*, Harr.—Only a few specimen seen. One was taken on a Hemlock log which was riddled with holes corresponding in size with this species in N. H. I have a specimen from a section of North Carolina, where Hemlocks are abundant, but where there are no Spruces or Firs. Harris' Ins. Inj., says he has taken it from the trunks of the White Pine. Possibly it was in the vicinity of Hemlocks.
27. *M. æneola*, Mels.—Beaten from Pitch Pines in July. Not common.
28. *Anthaxia æneogaster*, Lap.—On Buttercups in the vicinity of Spruces. Mass., N. H.
29. *A. viridifrons*, Lap.—On and about the Amer. Elm. June. Mass.
30. *A. quercata*, Fabr.—On Oak shrubs. Common. Mass.
31. *Xenorhipis Brendeli*, Lec.—Two males, one of them beaten from an Oak. Mass.
32. *Chrysobothris femorata*, Oliv.—Common on Oak wood and timber. A var. with the tips of the elytra narrower and cupreous, occurs on the White Birch (*D. alba*). Varieties *Lesueuri* and *soror* frequent Hickories. Mass.
33. *C. floricola*, Gory.—Abundant on Pitch Pines. Mass.
34. *C. dentipes*, Germ.—Not rare on Pine wood and timber, but not nearly so common as the last, nor does it appear to frequent the foliage of living trees to any great extent.
35. *C. trinervia*, Kirby.—On Spruce logs. N. H.
36. *C. Blanchardi*, Horn.—On trunks of sapling White Pines. Also dug out of dead trees of the same species. July, August. Mass. Not very common.
37. *C. scabripennis*, Lap. & Gory.—On White Pine wood piles, etc. Mass. On Spruce logs, N. H.
38. *C. pusilla*, Lap & Gory.—Beaten from Pitch Pines, common. May to August.
39. *C. sexsignata*, Say.—Rather scarce. Beaten from Pitch Pines. June to August.
40. *C. azurea*, Lec.—Three specimens, June and July on Sumac (*Rhus glabra*). In Entomologica, Vol. II, p. 231, this species is mentioned as having been found in numbers on a species of Dogwood. Besides the species of *Cornus*, *Rhus toxicodendron* is also called Dogwood here. The occurrence of the three specimens mentioned is of course by no means conclusive evidence.

41. *C. Harrisii*, Hentz.—Beaten from White and Pitch Pines, June to Aug. It breeds, according to Harris, in the small branches of the White Pine.

42. *Acmæodera culta*, Web.—Occurs on the flowers of the Wild Rose, Cranesbill (*Geranium maculatum*) etc. I think it breeds in dead Pines. Common. Mass.

43. *A. ornata*, Fabr.—Mass. Leconte, Revision Buprestidæ.

44. *Eupristocerus cogitans*, Weber.—Abundant on the foliage of Alders. June, July. Mass.

45. *Agrilus ruficollis*, Fabr.—On Blackberry (*Rubus*). June, July. Mass.

46. *A. torquatus*, Lec.—Rare. Mass.

47. *A. fulgens*, Lec.—On the Hazel (*Corylus Americana*). Not very common. June, July. Mass. Specimens found here are shining brassy or coppery.

48. *A. otiosus*, Say.—Very common on Oak shrubs. June, July. Mass.

49. *A. bilineatus*, Web.—Not rare on Oak foliage, logs, stumps, &c. July. Mass.

50. *A. vittaticollis*, Rand.—Taken occasionally in June, feeding on the leaves of Thorn (*Cratægus*), Shadbush (*Amelanchier*) and Chokeberry (*Pyrus arbutifolia*). Mass.

51. *A. granulatus*, Say.—Breeds in and frequents the stems of partly dead Alders. but does not appear on the foliage very much. It was found in considerable numbers in a single limited locality though usually quite scarce. June, July, Mass.

52. *A. interruptus*, Lec.—On foliage of Oak shrubs. Not rare. June, July. Mass.

53. *A. acutipennis*, Mann.—With the last. Not rare. June, July. Mass.

54. *A. anxius*, Gory.—Foliage of Poplar sprouts. Very rare. July. Mass.

55. *A. torpidus*, Lec.—A few specimens were taken on the summit of Mt. Washington, N. H., whither they had flown from below. The form described as *gravis* occurs in Mass. on Poplar sprouts and trunks.

56. *A. politus*, Say.—Common on low Willows. June, July. Mass.

57. *A. imbellis*, Crotch.—Occurs on *Helianthemum canadense* in June to August. Mass.

58. *A. egenus*, Gory.—I find but few specimens of this in my collection and do not know about its habits. Mass.

59. *Taphrocerus gracilis*. Say.—Taken in sweeping low herbage. May to July. Common. Mass.

60. *Brachysorata*, Web., *ærosa*, Mels., and *æruginosa*, Gory. All appear most frequently on Oak foliage, though sometimes on other deciduous trees. May to July. Mass.

61. *Pachyscelus purpureus*, Say.—Rare with me. It has occured at least once on Hickories, but I do not feel confident that that is the food plant. July, Sept. Mass.

62. *P. lævigatus*, Say.—Abundant on Bush Clover (*Lespedeza*). June, July. Mass.

On the origin of the genus Anthocharis, *Bdv.*

(= **Euchloe**, Hb.)

By T. D. A. Cockerell.

These delicate little butterflies, belonging to the genus *Anthocharis* of Boisduval, seem at first sight very aberrant members of the *Pieris* stock, with their one brood a year, narrow wings, and (in many species) orange apical patches on the forewings.

Yet in examining their characters as compared with those of *Pieris*, I have been driven to the conclusion that *Anthocharis* is by no means an ancient genus—as genera go—and that it arose directly from an old *Pieris* stock, and that probably on the American continent.

In stating the facts which have seemed to me to support such a view, it will be useful to review the peculiarities of the genus *Anthocharis*, and show how they may have arisen as offshoots from the stock from which the genus *Pieris* has also directly come.

Single-broodedness.—In Europe, *Pieris bryoniæ* of the Alps and far north is generally assumed to be the one-brooded ancestor of the double-brooded *P. napi* of the lowlands, and there is a tendency to assume that multiplication of the brood is a direct result of a warmer climate, and the idea of a single-brooded species arising from a double-brooded one seems not often to be entertained.

However, taking this same *napi* group in North America, we have still the assumed primitive type, *bryoniæ*, and likewise the forms *oleracea* and *venosa* to represent the European *napi*—so far the analogy is complete—but then we are met with what seems a strange anomaly, *Pieris virginiensis*, a delicate pale-winged form, appearing as a rare aberration in New York and Ontario, but actually as a spring-emerging one-brooded species in West-Virginia,—just exactly as if it were an *Anthocharis*, in fact! From this I think we get a clue as to the origin of *Anthocharis*—it did not arise from a one-brooded arctic form like *P. bryoniæ*, but was rather a branch from a stem which was probably *even then* double-brooded—and that accounts for its pallor and delicacy of structure, as fits an insect of the temperate zone.

Orange-tips.—Those species of *Anthocharis* which I regard as coming nearest to the primitive type of the genus,* do not present orange tips, but since these orange patches are so characteristic of many species it will hardly do to overlook them. In the first place, they are developed in the males—which seems to show that they are of the nature of secondary sexual characters, and have perhaps been perpetuated as such from

* See also Darwin, "Descent of Man," 2nd Ed., p. 312.

what was once a very rare variety or aberration. Secondly, it is well to remember that both *Pieris rapæ* and *P. venosa* have yellow aberrations, and even possibly (as I have argued in "Entomologist," 1888, p. 112,) came from yellow ancestors,—and thirdly, in one species at least of *Anthocharis* (*A. cardamines*) there is an aberration (ab. *aureoflavescens*, see "Entomologist," 1888, p. 189), in which yellow takes the place of orange.

Preparatory stages.—Dr. T. A. Chapman has an excellent paper ("Ent. Mo. Mag.," 1888, p. 257), in which he compares the egg of *A. cardamines* with that of *Pieris rapæ*—pointing out that the egg of the former becomes orange, while that of the latter is never darker than a pale yellow—and further, that the eggs of *cardamines* are laid on the flower-heads. Having the eggs of no other *Pieris* at hand, he goes no further with his comparison, and it might be supposed that these differences were in some sense generic. But it is not so: *Pieris protodice* is very common in Custer Co., Colorado, and lays its eggs profusely on *Arabis*, *Sisymbrium* and other cruciferous plants. These eggs are *orange*, and are nearly always laid *on the flower-heads* of *Arabis*, though also frequently on the stem and leaves of *Sisymbrium*.

Anthocharis ausonides (var. *coloradensis*, H. Edw.) flies here in May, and lays its eggs in the same situations as *P. protodice*. This year I sent Mr. W. H. Edwards a number of young larvæ, presumed to be those of *protodice*—and certainly seeming all to belong to the same species. But on the 1st of July he wrote: "Out of my *protodice* larvæ I got on the 30th (June) several proper pupæ (a ♂ *protodice* emerged from one of them some days later) and one of *Anth. ausonides*. I had not noticed any difference in the larvæ: I thought sometimes some were blacker than others—more black hairs." So it will be seen that in the earlier stages *P. protodice* and *A. ausonides* have the closest resemblance —the larvæ, in fact, are not distinguishable.

From these facts, I am inclined to believe that *Anthocharis ausonides* on the one hand, and *Pieris protodice* and its allies on the other, come nearest to the primitive stock from which both arose—and it is favorable to the idea of the antiquity of *ausonides* that it is the one species of its genus in America ranging to the far north—even Alaska. Assuming this, we are perhaps at liberty to construct a hypothetical *Protopieris*, and imagine a butterfly inhabiting the American continent ages ago, in shape somewhere between the modern *Pieris* and *Leucophasia*—perhaps double-brooded—in markings, with a central black spot and dark apical patches to the fore wings, on the underside gray, marbling on the secondaries (for the green I take to be a subsequent arrangement of the yellow and black scales*)—in color, possibly saffron or brimstone yellow, though probably already white, or partly so.

West Cliff, Custer Co., Colorado, July, 1888.

* And the green veining of the underside of *Pieris napi* is of the same nature—in neither case is there really any green pigment.

CORRESPONDENCE.

To the Editor of "Entomologica Americana."

The Address of Mr. J. B. Smith before the American Association for the Advancement of Science having elicited some comment on the part of several correspondents, I take the liberty of calling your attention to the fact of which Mr. Smith was ignorant at the time when he prepared his address, that the *entire collection* of Mr. W. H. Edwards of Coalburgh, West Va., has been purchased by the writer and forms a part of his collection of the Rhopalocera of North America. It is needless to say anything at length as to the advantages which flow to the writer in the matter of determining specimens of the Rhopalocera which may be kindly referred to him by correspondents. The collection with the additions of the collection of Mr. T. L. Mead, and additions made from the catches of various collectors from all over the United States is probably the most perfect collection in the world of the Diurnal Lepidoptera of Temperate North America. There are only a very few species hitherto catalogued as from this faunal region which are not represented and they are: *Colias Boothii*, Curtis; *Melitæa Helvia*, Sc.; *Melitæa Alma*, Strecker; *Erebia Rossii*, Curtis; *Erebia Sofia*, Curtis; *Chrysophanus Annica*, Edw.; *Pamphila Yuma*, Edw.; *Pamphila Bellus*, Edw.; *P. Horus*, Edw.; *P. Cestus*, Edw.; *P. Arabus*, Edw.; *Nisoniades Tatius*, Edw.; *Erycides Urania*, West. Hew.; and *E. Texana*, Sc.—For specimens of these the writer will give any amount in reason either of gold or pearls, or of specimens in exchange.

The species are represented in most cases by long series of specimens of both sexes, and the collection is rich in aberrations and seasonal forms. In addition to the collection of North American Rhopalocera the writer has obtained from various sources large numbers of the Rhopalocera of other faunal regions. The collection contains fully fifteen hundred species from the Antilles, Central and South America, over four hundred species from Equatorial Africa and the Cape; a full series of the strictly European species and over one thousand species of the Rhopalocera of the Asiatic mainland and the Malay Archipelago. Among the Asiatic species there is a very large and perfect set of the Rhopalocera of Japan, taken by the writer during his stay in that country as the Naturalist of the U. S. Eclipse Expedition of 1887. Species not taken by himself are represented by specimens purchased from the late Henry Pryer of Yokohama, or obtained from other collectors in the Empire of the Rising Sun. Of the species of Rhopalocera credited to the Japanese only three or four are lacking as yet. There are, in the entire collection, very nearly 4,000 species of the Rhopalocera of the world.

In the Heterocera an equally good showing in the number of species is made, but as the number of these vastly exceeds that of Rhopalocera in no case can any faunal region be said to be thoroughly well represented. The collection is tolerable rich in European forms. Of the species enumerated from North America in Grote's Check List about one-half are found in the collection, and when all of the material on hand shall have been correctly worked up and determined the number will no doubt be found to be largely increased. From Jamaica there are nearly 400 species as yet undetermined. There are fully one thousand species of Heterocera from Equatorial Africa in the collection of which only the merest fraction has been determined and no doubt many of the species are as yet non-described. The Japanese fauna is represented by nearly nine hundred species of Heterocera, among them the entire collection of the Hypenidæ, Deltoids and Pyralids of Japan made by Henry Pryer which the writer purchased in October, 1887, from his now lamented friend,—fully 375 species, the majority of them as yet undescribed, a monograph of which he now has in course of preparation.

In addition to these considerable collections there are large numbers of Heterocera from the Indo-Malayan region, derived from various sources, among them all the specimens contained in the collection of the late Dr. Rössler of Stuttgart, Germany.

While not making a study of the Coleoptera and other Orders the writer has incidentally obtained much valuable material, representing them. There are over 2,000 species of the Coleoptera of North America in the collection determined by such eminent authorities as Drs. Leconte, Horn and Hamilton. To the latter especially the writer is under manifold obligations for many kindnesses shown in the determination of species. Jamaica is represented by several hundreds of species of Coleoptera, mostly undetermined. Equatorial Africa is represented by over one thousand species, of which not more than five per cent. are determined. Japan is represented by a nearly equal number of which not more than fifty species are as yet correctly determined. The same remark holds good as to the Indo-Malayan region. The European Coleopterous fauna is represented by about seven hundred species mostly *Carabidæ* and *Cerambycidæ*. The *Buprestidæ* of Australia through a recent purchase are fairly represented.

In addition to collecting the insects the writer has found it necessary, owing to the absence of any great public library in the City of Pittsburgh, to also undertake the collection of works relating to Entomology and has amassed during the past five years the nucleus of a considerable collection containing the Transactions and Proceedings of al-

most all the Entomological Societies of the world and very nearly all of the leading works published in recent years upon the Lepidoptera.

The foregoing statement is not made in the spirit of vanity or egotism, but as a guide to friends who may be inclined to consult the writer and who is always happy to serve so far as the pressing engagements of a busy professional life allow him. He will cheerfully attend to correspondence as time permits and desires especially to cultivate an acquaintance with collectors in the Southern and Western portions of the United States.

Pittsburgh, Nov. 6, 1888. W. J. Holland.

Chambers' Corrections to his paper on the Illustrations of the Neuration of the wings of American Tineidæ.*

By Wm. Beutenmüller.

The following corrections were written in pencil by the late V. T. Chambers on the margins of the plates of a copy of the above named paper which he presented to Mr. Henry Edwards, to whom I am indebted for allowing me to make use of these unpublished notes.

Fig. 4.—Hind wing ought to have dotted line through the cell.

Fig. 5.—Omits furcation of apical branch of fore wing.—In the hind wing the submedian is too short and the costal and apical half of the subcostal are omitted.

Fig. 7.—Fore wing ought to have one more median branch.

Fig. 9.—Has one more marginal vein than it ought to have.

Fig. 10.—Hind wing wants one more branch of the subcostal—the 1st branch.

Fig. 13.—Hind wing wants one median branch.

Fig. 21.—Has one median marginal branch too many in the one wing and one too few subcosto-marginal branches, and the hind wing lacks the dotted line through the disc.

Fig. 23.—Has one median marginal vein too many in the fore wing.

Fig. 25.—Hind wing omits dotted line through cell.

Fig. 26.—Fore wing ought to have one more median branch.

Fig. 27.—Fore wing wants one discal branch.

Fig. 29.—Hind wing should have the median vein furcate on the margin.

Fig. 31.—Fore wing omits fold. Hind wing a little too wide.

Fig. 33.—Subcostal wants its branch to the hind margin.

Fig. 36.—Are not confident as to the furcation of the apical veins. Hind wing has one vein too many.

* Journ. Cin. Soc. Nat. Hist., Vol. II, pp. 194–199. 1880.

Fig. 37.—Hind wing ought to have the first discal branch dotted through the wing.

Fig. 41.—*E. concolorella* does not agree with mounted specimens so labeled (improperly?).

Fig. 42.—Should have the apical branch near to the subcostal and a dotted indistinct median branch in place of the distinct one which should be nearer to the subcostal.

Fig. 43.—Discal branch of wings ought to be furcate.

Fig. 45.—Hind wing instead of five marginal should have four, one of them furcate.

Fig. 54.—Omits furcation of apical branch of fore wings.

Fig. 55.—Should have one more submedian branch in fore wings.

Fig. 56.—Not strictly accurate. Hind wing has the discal branch much too distinct.

Fig. 57.—Fore wings should be caudate and the subcostal ought to be bent down to the median instead of *vice versa*.

Descriptions of some Lepidopterous Larvæ.

By Wm. Beutenmüllfr.

Drepanodes arcuata, Walk.

Head small, pale yellow with two transverse brown bands. Body above, bright green. Along the dorsal region from the 5th to the last segment reddish brown, marked with yellow, and limited on the subdorsal by a deep brown broken stripe which is sometimes quite obsolete and sometimes absent. On each of the 2nd and 3rd segments two prominent yellow tubercles tipped with reddish brown, and at the base at the outer side of each a small black wart. On the 5th segment are also two prominent tubercles which are wanting in some individuals. Anal segment provided with a short brown process covered with short bristles. Body beneath sordid white. Legs green. Over the body are scattered a number of small yellow piliferous spots each bearing a short white hair. Length about 23 mm.

Foot plant, White Birch (*Betula alba*). Lives singly on the upper surface of leaf on a white silken web slightly drawing the leaf together. Spins a thin cocoon between leaves. September.

Agrotis pitychrous, Gr.

Head shiny, pale brown, mouth parts pitchy black. Body sordid white, semi-translucent, with three equidistant chalky white stripes along each side, and one along the dorsum. Spiracles black. Cervical shield dirty white. Body below wholly sordid white, semitranslucent. Legs concolorous to the body. Length 36 mm.

Feeds on various species of maritime grasses. July.

Phycis rubrifasciella, Pack.

Head chestnut brown, mouth parts pitchy black. Body above dirty green with

two rows of minute black piliferous spots on each side, and all bearing a short light brown hair. Spiracles black. Underside of body same color as above. Length, 16 mm.

Lives singly in a pyriform case made of frass between the terminal leaves of the branches of *Myrica cerifera.*

Phoxopteris spireæfoliana, Cl.

Head small, yellowish green, with small black spot on each side of the anterior portion, mouth parts pitchy black. Body yellowish green with two rows of piliferous spots of the same color along the dorsal region, and two rows on each side. Underside same color as above. Length, 10 mm.

Food plant, *Spiræ opulifolia* (Nine Bark). Draws together the leaf between two veins so as to produce a fold. Double brooded. June and Sept. Hibernates in a cocoon between leaves.

The habits of Goes and Oncideres.

By M. L. Linell.

On the Palisades near New York *Goes pulchra,* Hald., was taken by me last season under circumstances that were strikingly suggestive of the habits of *Oncideres cingulata,* Say, on Carya sp. with large buds, the same that are preferred by the *Oncideres,* I saw *Goes* at work on the twigs, cutting through the bark nearly all around (and a little deeper in some places), but very irregularly, not making a clean ring. It impressed me that this must be done on purpose to kill the twig, with the intention of ovipositing on it, a well-known fact in regard to the girdler. The male was generally seen gnawing on the endbud of the same twig that the female was girdling, just as we so often see the pair of *Oncideres* together. When we take into account the wonderful resemblance in color and form between these two, though systematically widely separated species, the likeness is still more remarkable though the *Goes* is twice the size of the *Oncideres.* I think this is a fine instance of analogy in protective resemblance, similarity in habits having independently wrought their results in leading both to resemble the same thing, the maculation of the Carya twig. Both seem to live in the larval state for two years; in 1884, 1886 and 1888 *Oncideres* was very abundant, while not a single specimen could be found 1885 nor 1887. The species are not found together; the *Goes* appear in the first days of July and are completely gone before the end of that month, while *Oncideres* can not be seen before the last days of August and is abundant throughout September. This occurrance of *Oncideres* so late in the season, when few collectors visit the branches of trees, accounts for its rarity in collections and my success in

using it largely for exchange. Only *Cylleus Robiniæ*, Forst., of the *Cerambycidæ* has the same season, but is found on the Golden Rod, as is well known.

Of the other species of *Goes* I have taken *G. debilis*, Lec., about July 1st on Hickory, *G. tigrina*, De Geer, about July 15th on White Oak. The very rare *G. tesselata*, Hald., was found by Mr. A. C. Weeks and myself on Staten Island, in July, 1885. We took it by beating over the umbrella the dense 10 inch long shoots on freshly cut Oak-stumps. Only one pair and three single females were secured.

A New Spilosoma.

By Annie Trumbull Slosson.

Spilosoma prima, n. sp.

Size of *S. virginica*, but a stouter insect, body heavier and shorter, scarcely reaching anal angle of secondaries. Primaries sordid white, stained with ochreous, especially along costa and inner margin, and with scattered dots of dark brown. These are arranged almost exactly as in some specimens of the form of *H. textor*, Harris, known as *cunea* and *punctata*. The dots are much heavier and more distinct on costa, and there is a submarginal line, very plainly indicated, and composed of geminate dots on the venules. Secondaries sordid white. Abdomen thickly clothed with white hairs through which can be seen the yellow of body, with dorsal row of black spots. Palpi, coxæ and tibiæ very dark smoky brown, almost black.

Though this description may seem to differ little from those of other species, the moth itself seems quite distinct. Its peculiar ochreous shading—which makes the insect seem cream-color, almost buff, instead of white—the heavy, stout look, and, above all, the very dark smoky color of coxæ and tibiæ, differing so markedly from the light orange tints in *S. virginica*, *congrua* and *antigone*, give it an appearance quite unlike its nearest kin. Described from 5 ♂♂, 1 ♀, taken at light in Franconia, N. H., early last June.

Books and Pamphlets received during December, 1888.

Prairie Farmer, December, 1888.
Psyche, Vol. V. Nos. 151 and 152.
Synop. of Families and Genera of N. Amer. Diptera, by Prof. S. W. Williston.
Canadian Naturalist, Vol. XX, No. 12.
Fourth Report on Injurious Insects, by Prof. Lintner, N. Y. State Entomologist.
Bulletin, Nos. 5 and 6, N. Y. State Museum of Nat. History.
Le Naturaliste Canadienne, Vol. XVIII, Nos. 5 and 6.
Naturae novitates, Nos. 22, 23 and 24.
Comptes-rendus de la Société Entomologique de Belgique, No. 105.
Boletin de la Academia Nacional de Ciencias eu Cordoba, Argentine Republic, Vol. XXI, Nos. 1 and 2.

R. T. Pearsall, *Librarian.*

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The EPIPASCHIINÆ of North America.

By Geo. D. Hulst.

The *Epipaschiinæ* are a group of moths of comparatively few species, but of very wide distribution. A number of species have been described from the United States, several, (and the number is likely to be considerably increased), from South America, a number from Australia and New Zealand, and a number more from Hindoostan, altogether about 40 species.

The group though small and widely distributed, is nevertheless one of very great interest.

The *Epipaschiinæ* are separated from the Macrolepidoptera by the presence of three internal veins on hind wings; from the *Tortricidæ* and *Tineidæ* in that none of these internal veins are furcate at the base. From the most of the *Tortricidæ* and *Tineidæ*, as well as from the *Phycitidæ* and *Crambidæ*, in that the lower median vein of the hind wing has no hair pectination; from the rest of the *Pyralidæ* as well as from all others, by the presence of a membraneous process extending from the basal member of the antennæ backwards, sometimes reaching to the abdomen.

But while thus having their own peculiarities which separate them from all others, the *Epipaschiinæ* differ widely, almost radically, among themselves. The differences in palpi, maxillary palpi, antennæ, antennal process, ocelli, venation, wing vestiture, and armature of the legs are very remarkable. Among the species is at least one with palpi short and porrect, while others have the palpi long, erect, or curved over the head and extended over the thorax like *Acrolophus*. Among the species are some in which the maxillary palpi are invisible, in others these organs are

very prominent. In some the maxillary palpi are single and scaled, in others bilobed at the end, and furnished with long pencils of hair. Among the species are some with the antennæ of the male very strongly pectinated, in others there are tufted-pubescent. In some, the antennal process is long, covered with long hairs and scales, in others the process is hardly indicated. In some, there are 12 veins in the fore wings, in others 11 ; in some, the male and female agree in venation, in others they are very widely different. In some the fore wings of the male have a costal fold and a vitreous spot beneath, others have neither. Sometimes vein 1 of the fore wings is furcate at base, sometimes it is not so. Some have the cell of the hind wing very short, others of the usual length ; some species have ocelli, one at least has none. Some have the hind tibiæ with two pairs of spurs, one has the end pair only. Some have the tarsi spinulated the whole length, others have them weakly spined at the end. Some have both wings tufted, some the fore wings only. In some the male uncus is hooked, sharp, slender, forked at base, in one species at least, obtuse, scutelliform. Altogether the subfamily covering about two score species gives a pretty wide range of variation, which makes the family a rather difficult one to limit, except by the presence of the unique antennal process.

The first American species known were described by Prof. Zeller in Isis, 1848, and for the two species named by him he erected the genus *Tetralopha.* Afterwards species were described by Clemens, Zeller, Grote, and myself. Mr. Grote first attempted a systematic synopsis of the species, and in the Bulletin of the U. S. Geological Survey, Vol. IV, gave the name *Epipaschiæ* to the group, determined new genera, and gave figures of venation of the genera, which, corrected, were published in the N. A. Entomologist. Mr. Meyrick has given a synopsis of the species of Australia and New Zealand, and described in that synopsis a number of genera.

Those who have endeavored to classify the insects have seemed to differ quite widely as to their affinities, and as a consequence have catalogued them in widely separated positions. Guenée places his genus *Glossina* in the *Pyralidinæ* between *Aglossa* and *Asopia.* But Guenée knew the female only. Lederer keeps the genus in the same place calling it *Stericta,* as *Glossina* was preoccupied, but says he does not know the insects described by Guenée. He, however, has one other species of the *Epipaschiinæ* and describing it as *Deuterolyta conspicuilis* places it near and above *Botis,* undoubtedly looking upon it as belonging to the *Pyralidinæ.* Mr. Meyrick in his works upon the Microlepidoptera of New Zealand and Australia, discusses the group, calling it "*Epipaschiadæ,*" and concludes it should be catalogued at the head of the

Pyralidæ. Lord Walsingham, in describing the very pecu'iar species *Cœnodomus hockingi,* says that Mr. F. Moore suggested to him that the genus was allied to the European genus *Aglossa* and that he agrees with him. So far every systematist dealing with Australian and East Indian material places the group in the neighborhood of *Aglossa,* and generally all agree that it is very closely akin to that genus.

But on the other hand Prof. Zeller regarded *Tetralopha* as a Phycitid. Clemens placed *Epipaschia* among the Deltoids by mistake, but put the other species he describes under the heading "*Phycites.*" Mr. Grote separates the species from the "*Phycidæ,*" but places them just before that subfamily, while remarking they have certain affinities to the *Galleriidæ.* These all agree that the *Epipaschiinæ* find their nearest allies in *Phycitidæ.*

The determinations seem to have been made as the writers had or had not possession of the American, especially the 11-veined species. Without these species the affinities have seemed to be mostly with the *Pyralidinæ.* With these, it seems, the systematists could not remove the the group from the *Phycitidæ.*

We are not in possession of the East Indian or Australian species, and so are unable to make any statements based upon personal examination of them. But with the descriptions of Mr. Meyrick and Lord Walsingham, and having in our possession probably all the American species, we have, we think, a solution of the systematic difficulty.

Mr. Meyrick, in a paper upon the Classification of Australian *Pyralidina,* (Trans. Ent. Soc. Lond., Dec. 1885, p. 421), says, "I think the *Pycididæ* may be regarded as a development of the *Galleriidæ*"; and again further on, "The *Pyralididæ* and *Epipaschiadæ* are referable to a common ancestor very little removed, and the same can be said of the *Scoparidæ* and *Crambidæ*: whilst the *Galleriidæ* come from somewhere between these two presumptive ancestors."

Personally, we fail to see any evidence of a possible development of the *Phycitidæ* from the *Galleriidæ.* The peculiarities of the *Phycitidæ* in venation, wing shape, maxillary palpi, labial palpi and antennal structure have no indications in the *Galleriidæ*; but in all these we have kindred, if not identical developments in the *Epipaschiinæ.* At the same time there is in many respects a likeness to the *Pyralidinæ,* so that we would connect the *Phycitidæ* with the *Pyralidinæ* through the *Epipaschinæ*; or perhaps the latter is the ancestral and now nearly obsolete stem, from which in different directions the other two have arisen. The species which the old world furnishes, show a marked relationship to the higher Pyralids, but the American species show even more decided leanings to the *Phycitidæ,* so decided indeed that one is almost forced

into joining them as somewhat aberrant members of the same subfamily. Taking the 11-veined American species, almost every peculiarity possessed by them is found among the *Phycitidæ*, and even in the antennal process there is an insensible intergradation into what is found in the *Phycitidæ*.

It is highly probable that too much importance has been given to the possession by these insects of this peculiar antennal process. One ought to be cautious in giving even generic weight to a secondary sexual character, but when there is a gradation from a strong development into the entire lack of the character, relationships should be sought for on other grounds, and if possible in those which like the antennal process are more or less peculiar, viz: the pencil-tufted maxillary palpi, the bitufted antennæ, the erect recurved palpi, the cross ridges of scales on wings, the costal fold beneath the fore wings, and the genital armature. Taking all these characteristics we feel certain our American species are very nearly related to the *Phycitidæ* and that they connect these with the *Pyralidinæ* though much closer to the former than the latter.

The points of affinity to the *Phycitidæ* are not a few and even in their widest differences the two groups are strongly correllated.

In the palpi, antennæ, clypeus, ocelli, pencillate maxillary palpi, venation, costal fold, viteous spot, scale ridges and general construction of the genitalia the *Epipaschinæ* agree with certain of the *Phycitidæ*, or, what amounts to quite as much, they do not agree with each other.

The points of difference are as follows: 1st, the bilobed maxillary palpi; 2nd, the antennal process; 3rd, the basal tuft on underside of fore wings on inner margin; 4th, the frenulum, single in ♂, double in ♀; 5th, the hair pectination of the lower median vein of the hind wings. In all these the *Epipaschiinæ* are distinct from the *Phycitidæ*.

In most of these very peculiarities of the *Epipaschiinae* however, there is an approach to the *Phycitidae*, or the tendency is found among the *Phycitidae*. The bilobed maxillary palpi we speak of as a difference though it is by no means such. It is rather one of the most convincing proofs of close relationship to the *Phycitidae*; for this peculiarity, otherwise so far as we know unique, is possessed by some of the *Phycitidae*. The bilobing is a modification of the two ultimate members in which the last is set not on the end but on the side of the one below, and generally near its base, so that in some instances the two members seem to be almost set together on the summit of the antepenultimate member. Among the *Epipaschiinae* there is some variation, for in *Oneida lunulalis* the end member is above the middle of the one on which it is placed. Among the *Phycitidae* in all cases of the hair pencilling of the maxillary palpi examined by us, both the end members are pencilled, and there is

in some cases the existing of the bilobing. In *Rhodophaea advenella* the last member is not on the end of the one below. In *Dioryctria mendacella* and *Pempelia ornatella* the bilobing is distinct, the end member being set nearly at the base of the one below it. In *Pempelia ornatella* as in others of the pencil-tufted species where the bilobing does not exist, the antepenultimate member is long, filiform, just as it is found in some of the *Epipaschiinae* and the counterpart of its appearance in *Oneida lunulalis.*

The antennal process is not possessed by any Phycitid, yet *Etiella* has a more marked basal antennal protuberance than has *Attacapa callipeplella.* Indeed, if the antennal process be insisted upon as a subfamily characteristic, *Etiella* must be catalogued with the *Epipaschiinae.*

The frenulum is a secondary sexual character, though one we consider of very great value, and so far as we have observed, no Phycitid has the frenulum double in the ♀, as is the case with all *Epipaschiinae.*

The pectination of the lower median vein of the hind wings separates them so far as we are aware from all *Phycitidae.* But to make this peculiarity a basis of subfamily separation seems to us to be giving it an unwarranted importance. Mr. Meyrick (Trans. N. Zealand Inst., Vol. XVII, 69, 1884), places in the *Scopariinae* two genera and in the *Botidinae* one genus, (Trans. Ent. Soc. Lond., Oct. 1884, pp. 293 and 328), in which the lower median is pectinated. This peculiarity is not made a necessary basis of separation in the *Tortricidae,* for in spite of it, in view of other characteristics, Prof. Fernald and Mr. Meyrick place those with and without this distinction in the same subfamily when they agree in the possession of the developed genital uncus, (Trans. N. Zealand Inst., Vol. XVII. 141, 1884).

We can not, of course, make linear catalogues, but from what has been said we think in American catalogues the *Epipaschiinae* and *Phycitidae* must go together, and that they cannot, without violence, be separated.

In our study of the North American species we have found some novel and to us unique characteristics, to which reference has already been made. These we will now review more in detail.

PALPI.

In these species the most remarkable characteristics are the length of this organ, and the length and position of the end member. In all cases the palpi are long, and when erect, exceed the head. The 2nd member is comparatively long, in some cases very long; and is always heavily scaled, more especially in the male. The end member is comparatively short, sometimes exeedingly short; it is variable in shape, sometimes

oval linear, sometimes conical. It is generally set on the end of the second member, but in some cases in front, and in one species does not reach as high as the summit of the second member.

MAXILLARY PALPI.

These show a remarkable, and, if we except some *Phycitidae*, a unique characteristic. The maxillary palpi are present in all species we have examined, though in the synopsis hereafter given we speak of them as being *invisible* in some species. They are in these entirely beyond observation except under the most careful preparation of the head parts, and then only under a power of at least 20 to 30 diameters. But in all cases the characteristic is the same. The end member is not on the summit of the member next below, but is set upon it nearly at its base, sometimes seeming to be directly from the same stem. All systematists have noticed the bi-tufted maxillary palpi, but none seem to have noticed that it was accompanied with a remarkable modification of the organ itself.

EYES.

The eyes are surrounded with a fringing of short hairs.

ANTENNÆ.

The antennæ are in no respects strongly peculiar, except in the presence of the basal membraneous process. They are doubly bitufted pubescent on the basal and middle segments, and simply pubescent towards the end. In one species each segment, basally and medianly, seems to be doubly tritufted. The tuftings are on the posterior side, and are shorter in the female. In all cases the antennæ are scaled in front.

The process is subject to great variation in shape, as will be seen from the figures.

THORAX and ABDOMEN.

There is, so far as we have noticed, no peculiarity about the thorax or abdomen, except in one species; in that the abdomen is tufted laterally on the penultimate and antipenultimate members much after the manner of *Samea*, Guen. The genitalia differ in some respects in the direction of the furcate basal part of the uncus, and in the lateral spines.

WINGS.

There are some remarkable peculiarities in the wings. In some of the species the wings are simple and correspond in both sexes. In others there are modifications of a sexual character which, taken as a whole, are extraordinary, and, so far as we are aware, unique. In the females the wings are simple, and follow the normal structure. In the males there is a costal fold of long scales ranged transversely beneath

the wing, and under this, more or less concealed, a vitrifying of the discal space. This vitrifaction essentially modifies the venation ; the cross vein on the outer margin of the discal cell is lost from its place, and vein 6 continues almost to the base, to which place the outer discal vein seems to be forced. The vitrifaction is both sides vein 6, and this is pushed out by the spaces in waves back and forth. The costal and subcostal veins are strongly modified, being driven together, and having the appearance of anastomosing. The costal space is broadened basally. The lower median is extraordinarily broadened, especially at and beyond the union with vein 2, where it is swollen and seems to be filled with a liquid in color and appearance much like that which exudes from the wings when punctured during expansion. We are confident the insect can at will expand the tuftings of the maxillary palpi, and can project forward the costal scale fold, and expose the vitreous space, and can thus with its bitufted antennæ and movable scaled process added, far beyond the ordinary ability of the Lepidoptera, flaunt its beauty peacock-like before its mate for the sake of gaining her admiration and becoming her choice in love.

Another peculiarity of the wings is a patch of short stiff hairs at the base of the fore wings between vein 1 and the inner margin.

Still another peculiarity is the frenulum which is single in the male, divided in the female.

Vein 1 is sometimes furcate near the base, sometimes not, in the same species. No reliance can be placed upon this peculiarity for generic determination. This is the only point of structure which gives any suggestion of relationship to the *Galleriidae.*

In a few instances we have found veins 4 and 5 of the fore wings, after separation from the angle, joined again, forming a cell. This is, however, a characteristic not permanent to the species.

Still another very extraordinary characteristic is the existence in some species of 11 veins only in the fore wings of the ♂, while the ♀ has 12. From very careful observations upon finely prepared specimens, we are of the opinion that this is due to the coalescing of 10 and 11 through the modification caused by the vitrified space. In the 11-veined females, the same thing has happened from other causes. With Mr. Meyrick we agree that no vein is ordinarily lost, save by coalescing with another, the point of furcation being moved beyond the edge of the wing.

Still another peculiarity is the strong tendency to iridescence on the posterior portion of the fore wings beneath. It is ordinarily apparent as a mother of pearl luster, but under a strong glass with very strong light it shows out with a splendor we have rarely or never seen surpassed.

LEGS.

The legs are generally very squammosely clothed. The tarsi only are spinulated, in some cases the hind tarsi only, but the tarsal hairs so nearly appear like spines that it is difficult to tell the difference save in carefully prepared specimens and under a strong magnifying power. In all cases the spinulation is most decided on the hind tarsi. In the other tarsi it is sometimes altogether wanting. The middle tibiæ are armed as is usual, the spurs being strong, the outer one generally much the longer. In a single instance the hind tibiæ have the end pair of spurs only, a variation so remarkable in so small a family that we assert it only after careful and repeated observation.

The feet are 2-clawed, the claws sharp, rounded, sickle-shaped, with an angular projection at the middle of the concave side. The foot itself between the bases of the claws is furnished with a prominent projecting pad, an organ which we have not hitherto observed in the Lepidoptera. From the base of the claws above a number of long slender spines project, curved somewhat inwardly about the foot.

The following synopsis, as well as what has been said above, is based upon the species of North America only.

EPIPASCHIINÆ, Wals.

Epipaschiae, Grote, Geol. Surv. Terr. Bull. 4, p. 685, 1878; N. A. Ento. I, 7, 1879; *Epipaschiadae*, Meyrick, Trans. Ento. Soc. Lond. April, 1884, 62; Trans. Ento. Soc. Lond., Sept., 1887, 187; *Epipaschiinae*, Walsingham, Trans. Linn. Soc. Lond. V, pt. 2, 47, 1888.

Head:

Palpi, erect or recurved, long or very long, heavily scaled; 2nd member long, 3rd short or very short.

Maxillary palpi, bilobed at end, often strongly developed and pencil tufted in ♂, smaller and not pencil tufted in ♀; sometimes invisible in both sexes.

Eyes, globular, protruding, fringed, rather widely separated.

Ocelli, present, distinct.

Clypeus, flat or slightly rounded, broad, without hair tuft.

Antennae, in front scaled, behind double tri- or bitufted pubescent except near end, there pubescent; from basal member posteriorly, a membraneous scaled process.

Tongue, strong, long, scaled in front near base, divisions strongly marked.

Thorax, broad, generally heavy, patagiæ long scaled, a tuft of long scales beneath at base of fore wings.

Wings.

Fore wings, broad, costa straight or somewhat arched, apex never

sharp, sometimes obtuse rounded; outer margin rounded, inner margin rounded, generally slightly sinuate. Above, the most of the species have 2 crossbands of larger scales, which in places rise up into tuftings; two cross lines limiting the basal and middle fields. Beneath, both sexes with the usual hair tuft receptacle in which the frenulum is hooked; a tuft or patch of coarse, not very long, hairs at the base of the wing between vein 1 and the inner margin. In some of the species, in the males, a costal fold of coarse transverse scales extending from base sometimes $^2/_3$ the length of costa. Beneath this and partially or altogether hidden a vitreous spot.

Hind wings, broad, nearly unicolorous, with rather indistinct anterior angle and rounded anal angle.

Venation.

Fore wings, 12- or 11-veined, venation very variable, but 7, 8 and 9 always stemmed, 3 always separate. A peculiar feature is in the abnormal venation of those males which have the costal fold and vitreous spot on the fore wings; the ordinary plan of venation is essentially modified, the outer discal limitation being lost and the lower median being greatly widened and swollen.

Hind wings, with 3 internal veins, and 8 veins in all, counting after the method of most of the great systematists and the method now almost universally adopted; cell short and closed, 8 reaches the base, being joined with 7 by a short cross vein beyond the cell. Subcostal present, distinct near anterior angle, but becoming obsolete always before reaching base. Otherwise the venation is variable.

Frenulum, single in ♂, double in ♀.

Abdomen, cylindric, not tufted, with one exception.

Genitalia. Uncus prominent, slender, bent, furcate at base; inferior lobe somewhat ladle-shaped, fringed on upper posterior margin with stiff inwardly directed hairs; side lobes rather prominent with long hairs turned inwardly and sometimes with stout incurving spine at base.

Legs, rather short, stout, generally loosely scaled, tarsi generally spinulated, claw sharp, sickle-shaped.

Fore legs. Coxæ broad, flattened, oval, broadest at base; femora flattened, stout; tibiæ short, about $^1/_2$ femora, tibial epiphysis near middle and less than $^1/_2$ tibiæ in length. 1st tarsus as long as tibia, and about as long as the rest together; femora sometimes tufted on end.

Middle legs. Coxæ, femora and tibiæ flattened-cylindrical, the tibiæ enlarged at lower end; tibiæ with a pair of spurs at end; tibiæ a little shorter than femora; 1st tarsus nearly as long as the rest together.

Hind legs. Femora and tibiæ cylindric, not incrassated; tibiæ with end pair of spurs, and generally with middle pair also; femora $^2/_3$ the length of tibiæ; tibiæ somewhat tufted at summit; 1st tarsus nearly as long as the rest together.

Larvæ as far as known cylindric, with small hair tufted tubercles on each segment; head rounded; legs 16. They live concealed in folded leaves, held thus by fastenings of silk, and sometimes in tubes of silk and frass within these. They pupate in a close cocoon on the surface of the ground. Some of the species are double brooded, and some at least remain in the cocoon unchanged as larvæ till the following Spring.

SYNOPSIS OF GENERA.

1 Fore wings of ♂ simple, 12-veined in both sexes ..... 2.
Fore wings of ♂ with costal fold and vitreous spot beneath ..... 6.

2 Maxillary palpi present ..... 3.
Maxillary palpi invisible ..... Oneida.

3 Hind tibiæ with 2 pair of spurs ..... 4.
Hind tibiæ with end pair of spurs only ..... Yuma.

4 Maxillary palpi scaled in ♂ ..... Epipaschia.
Maxillary palpi pencil tufted in ♂ ..... 5.

5 Process long ..... Cacozelia.
Process short ..... Stericta.

6 Fore wings 11-veined in ♂, 12-veined in ♀ ..... 7.
Fore wings 11-veined in both sexes ..... 8.

7 Fore wings, 10 and 11 separate; 6 stemmed with 7, 8 and 9 in ♀; palpi erect, not recurved over head; 3rd member on end of 2nd member and comparatively very long ..... Lanthaphe.
Fore wings, 10 and 11 stemmed, 6 separate; palpi long, re-curved over thorax, Acrolophus like; 3rd member very short, set in front of the 2nd member .. Saluda.

8 Maxillary palpi present; antennal process more or less developed ..... 9.
Maxillary palpi invisible; process hardly indicated ..... Attacapa.

9 Fore wings 6, 7, 8 and 9 stemmed in ♀ ..... Tioga.
Fore wings 6 separate in ♀ ..... Tetralopha.

EPIPASCHIA, Clem.

(*Epi*, upon, and *paschein*, to be impressed.)

Clemens, Proc. Nat. Sci. Phila., Jan. 1860, p. 14; Grote, Proc. Bost. Soc. N. Hist., Vol. XIX. p. 262, 1877; Geol. Surv. Terr. Bull., IV, 685, 1878; N. A. Ento. I, 9. 1879; Meyrick, Trans. Ento. Soc. Lond., April 1884, 62, Trans. Ento. Soc. Lond., Sept. 1887, 187.

Deuterolyta, Led., Wien. Monats., VII, 358, 1863; Grote, Buff. Bull., II, 77, 1873; Meyrick, Trans. Ento. Soc. Lond., Sept. 1887, 187.

Mochlocera, Grote, Can. Ent., VIII, p. 151, 1876; Geol. Surv. Terr. Bull., IV, 686, N. A. Ent. I, 9, pl. 2, f. 2; Meyrick, Trans. Ento. Soc. Lond., Sept. 1887. 187.

Catamola, Meyr , Trans. Ent. Soc. Lond., April, 1884, 63 ; l. c. Sept. 1887, 187, l. c. Oct. 1884, 280.

Astropometis, Meyr., l c. April 1884, 67 ; l. c. Sept. 1887, 187.

Palpi erect, reaching above head, heavily scaled, end member short, less than ¼ the length of the second, maxi lary palpi scaled ; antennal process strong, long, reaching back over thorax, with long hairs and scales, except basally and above where the scales are short and closely laid ; thorax stout ; fore wings 12-veined, 1 often furcate, 4 and 5 stemmed or separate, 6 separate, 7, 8 and 9 stemmed, 10, 11 and 12 separate ; above with cross ridges of scales running into tufftings, simple beneath ; hind wings 8-veined, 3 separate, 4 and 5 separate or stemmed, 7 and 8 separate or stemmed ; cell very short.

Genitalia, normal.

I did not know of Mr. Meyrick's work upon the *Epipaschiinae* until after I had published the article in Ento. Am., Vol. III, pp. 113—118. I have since then examined quite a number of specimens of American species, and incline to agree with Mr. Meyrick's final determination that differences of venation which elsewhere would be a reliable basis of division cannot be relied upon in this subfamily. As a consequence, several genera which would be valid under ordinary circumstances, must be combined.

There can, we think, be no doubt of the identity of *Denterolyta* with *Epipaschia*. Mr. Grote says (Buff. Bull. I, 177, 1873) that he sent a specimen of his *D. borealis*, to Prof. Zeller and he, on Lederer's authority, identified it as Lederer's species ; but *D. borealis*, Grote, is *Epipaschia superatalis*, Clem.

SYNOPSIS OF SPECIES.

Fore wings olive or ochre yellow, hind wings light fuscous.....**superatalis.**
Basal field blackish, hind wings dark fuscous .....**zelleri.**

E. superatalis, Clemens. Proc. Acad. Nat. Sci., Phila., 1860, p. 14 ; Grote (*Epipaschia*), Proc. Bost. Soc. N. Hist., XIX, 262, 1877 ; Geol. Surv. Terr. Bull., IV, p. 686, 1878, N. A. Ent., I, 9, pl. I, f. 1, 1879.

Conspicualis, Led. (*Deuterolyta*), Wiener Monats., VII, 360, pl. VII, f. 16, 17, 1863 ; Grote, Buff. Bull., I, 177, 1873.

Borealis, Grote, (*Deuterolyta*), Buff. Bull , I. 177, 1873. II, 77, 1874, Proc. Bost. Soc. N. Hist , XIX, 262, 1877.

Olivalis, Hulst, (*Tetralopha*), Trans. Am. Ent. Soc., XIII, 160, 1886.

Palpi rather slender, erect, considerably exceeding head ; end member rather prominent, somewhat inclined forward ; maxillary palpi quite long, a little ascending, thrust forward between the palpi ; palpi, maxillary palpi, front and base of antennæ and process ochre or olive yellow. Ocelli distinct. Process long, reaching nearly to abdomen, closely scaled above, long haired below, except at end where the hairs become long scales. Antennæ double bitufted-pubescent, more marked in male than female. Fore wings dusty ochre or olive yellowish, gray with powdery black

lines. Inner middle line marked on costa by a black dot; below it is obsolete, or partially indicated. A black discal dot near the costal spot of the inner line. Outer line irregularly denticulate, better marked superiorly, where it runs obliquely outward to median nervules, produced about vein 4, thence running inwardly below vein 3, whence it descends, very slightly outwardly projected, to internal margin. Terminal field wide; a diffuse, broad, brownish or blackish shade-band marking the veins. A terminal series of distinct interspaceal black marks becoming continuous inferiorly. Fringes pale, interrupted with brown and with a dotted line. Hind wings fuscous, the veins darker marked; a discal dot very near the base and costal border; a terminal distinct line; fringes pale, with a dotted brown line. Beneath yellowish-gray, sometimes suffused with blackish; a common line and discal dots; the terminal shade on fore wings less prominent than above, and here also continued on secondaries.

Venation.—Vein 1 of the primaries is almost always furcate near the base, the furcation being sometimes merely a notch and sometimes extending as a vein to base. 4 and 5 generally join at base or are separate. On secondaries 7 and 8 are separate.

The insect seems to be very widely distributed. It is taken in the U. S., east of the Rocky Mountains, and Lederer's specimens came from Brazil. I have found the larva on *Rhus toxicodendron* and *Rhus glabra.* It is tortriciform, marked on the segments with black dots. It folds over the leaf or joins together the leaflets, and lives within the habitation thus formed. It is almost without doubt 2-brooded.

E. zelleri, Grote, (*Mochlocera*), Can. Ent., VIII, 157, 1876, Proc. Bost. Soc. N. Hist., XIX, p. 264, 1877; Geol. Surv. Terr. Bull., IV, 686, 1878, N. A. Ent., I, pl. 2, f. 2, 1879.

Palpi heavy, erect, reaching above head, heavily ridge-scaled in front and thus flattened in appearance. 3rd member rather fine, distinct; maxillary palpi as in *superatalis*, not quite so prominent. Palpi, maxillary palpi and head blackish gray. Antennæ strongly double bitufted in ♂—slightly so in ♀. Antennal process long, reaching nearly to abdomen, closely scaled above, heavily clothed with long scales and hairs below and at the end. Male antennal process as long as the thorax, or nearly so. Male maxillary palpi scaled. Labial palpi a little exceeding the front, curved upward, with the third joint shorter and more distinct than in *Epipaschia.* Fore wings divided into three fields by the median lines. Inner line defining outwardly the blackish basal space. The line itself is black, with a slight median notch, perpendicular. Median space washed anteriorly with white. A short, black, discal streak. Outer black line very finely denticulate, shaped much as in *superatalis*, but not produced so much on median nervules. It arises at about apical third, at first outwardly oblique, then running inwardly below median vein and narrowing the median space thence to internal margin. Terminally the wing is again black or blackish. A broken black line at the margin. Fringes on both wings dark, pale at base, with broken blackish interline. Beneath blackish, with common shade-band and black discal point on hind wings.

Venation.—Vein 1 of primaries is very rarely furcate at base, 4 and 5 are always separate at base. On secondaries 4 and 5 are joined at base.

Tex., N. Mex., Mo., probably everywhere West of the Mississippi to the Rocky Mountains and North to Nebraska and Iowa.

[TO BE CONTINUED.]

Notes on Rearing Lepidoptera.*

By R. F. Pearsall.

So little has been done as yet in rearing Lepidoptera, that no one method can be classed as superior to others, nor will any insure success. This is dependent upon the care and diligence of those who make the attempt. In my experience I have endeavored to re-produce as nearly as possible the conditions which surround the various larvæ in nature. How best this can be done is a constant study to a mind fertile in expedients, for these conditions include degrees of heat, moisture, space, light, condition of food-plant, and proper facilities for pupation, all suited to the various kinds of larvæ. In supplying these one finds that no rule can be applied to a single family, so diverse are their needs. Take that of *Acronycte* among the *Noctuidae.* I will recall my experience with *A. ovata.* I had been annoyed at its persistent attempts to cut through the corners of my wooden boxes in constructing its cells of woody particles, when it occured to me that a piece of dead-wood might be preferred by it, and thus save my boxes from destruction. I placed a piece eight inches long, and perhaps three inches in diameter in the box, and all my larvæ disappeared mysteriously except two. However, in due course, my stick of wood gave out some fifty perfectly developed imagos, and this without being disturbed to outward appearance. It is a mistake to suppose that a supply of fresh air is essential to the health of larvæ. Cleanliness and freedom from mould is of first importance. Next in order is the condition of food-plant. While it is possible in some cases to transfer larvæ from one food-plant to another of kindred family with success, it can be done more easily just previous to, or during the period of moult. Some species, however, prefer starvation rather than taste other than their own particular plant. *Sumach* is not *Sumach* to *Datana perspicua,* unless it be the broad-leaved variety.

The selection of food plant, too, is an important matter. When you have taken your larva feeding in the open woods, on leaves tossed in every breeze, and mellowed into a richness and texture that only sun can give, don't go to the shady border of that wood and gather them, thin, sour, and perfect as a maiden of fifty. They will prove as disastrous to your larvæ as green apples to the school boy. I have found also that heat during larval existance is an important factor in determining the duration of pupal life. Species, ordinarily single-brooded, may be persuaded to go through these transformations at once, instead of going over the winter. I tried it, and was successful in the case of *Edema Albifrons,* bringing out some eighty specimens, while my friend

* Read before the Soc., Jan. 8, 1889.

Mr. Elliott was equally successful with *Datana perspicua.* Specimens thus produced are, I have found, less liable to grease than others. So it is with specimens of the first brood in all species producing more than one brood in a season.

While a certain amount of space dependent upon the larvæ collected is desirable for some species, it is also a fact that others do better if confined in close quarters. I refer particularly to various *Cochlidiæ*, *Ceruræ*, and *Notodontæ*. In the case of one variety of the latter I found it impossible to bring them through until I confined them in a close tin box two or three together almost air-tight, and in this way they reached maturity without trouble.

Many species feed only at night, and these may be hastened in their growth by being kept in a dark box. Thus it will be seen that only experience and careful observation of the habits of larvæ, coupled with that great essential of all, cleanliness, will produce satisfactory results in the rearing of Lepidoptera. If the larvæ are not properly tended, your pupæ will produce imperfect, weakly specimens.

The treatment of pupæ is a matter of experiment to most of us. Many species remain as larvæ within their pupal shells until the Spring, and these require special care both as to moisture and temperature. I have found it possible by a constant and careful application of heat to produce Winter specimens from many pupæ, but unless great care is exercised not to hasten them too much, your imagos will be but thinly covered with scales, and their colors faded.

I feel that my subject has been but barely touched upon as yet. Many things I would like to present on the habits of larvæ so full of interest, their diseases and enemies. The *Coelodasys* group which feed in the margin of leaves so nearly resembling by their jagged outlines and colors, and the actual shape of the leaf, as readily to escape attention are especially of interest.

The *Catocolæ* too stretched at length along the dead twigs or hidden in the interstices of the bark, which when touched fling themselves into the air for many feet with a faith as to the result, that might inspire more of us with courage. It is a remarkable fact that at various periods of their lives, larvæ seem to require food other than vegetable. I refer to their habit of eating the shells of their eggs when first hatched, and their cast off skin at each successive moult. It has been supposed that this was done as a matter of protection, in order that their enemies might not be aware of their presence by it, but I have found that it has a much more important place than this in their economy, for if deprived of this stimulent to their appetites, in most cases they refuse food and die, particularly in the early stages of their growth.

These and many more I might mention, are worthy of study.

Preparatory Stages of Dasylophia anguina, *Sm. Abb.*

By Harrison G. Dyar.
Rhinebeck, N. Y.

Egg.—Evenly rounded, flattened above and below, smooth. Color reddish, deepening in shade above; diameter about .7 mm.

Newly hatched larva.—Of a yellowish color, streaked irregularly longitudinally with red laterally, and marked with the same color on joints 5, 11 and 12, joint 5 being completely red. Head yellowish, marked with red. Body covered sparsely with black hairs which are much more stout and bristly on top of joints 6, 7 and 8, than on any other part. Length about 3.5 mm. The anal feet are not used in walking.

After 1st moult.—Color greenish with several interrupted lateral brownish lines; on joint 5 two elevated brown spots, and one on joint 12. Head reddish orange; anal feet brown.

After 2nd moult.—Color violet blue with a lateral, and a wide dorsal, bright yellow stripe, edged with black, the dorsal stripe divided by a black line and reaching only to joint 11, being replaced on joint 12 by a black spot; a black spot on each side of joint 5, and a row of larger spots one on each joint above the bases of the legs; last joint marked posteriorly with black; head orange.

After 3rd moult.—Same as in the preceeding stage except that the dorsal stripe is of a more reddish shade.

After 4th moult.—Mature larva: body cylindrical, tapering somewhat to each extremity, the anal feet elevated and not used in walking; head rising above the top of joint 2, of a red color. The body is of a shiny, reddish purple, with seven longitudinal black lines, one dorsal and three on each side, the lateral ones confluent on joint 11 leaving the ground color light blue between them. This color also edges narrowly the dorsal line of each side. Below the lateral lines is a broad yellow band, white in the center, and below this a row of large black spots, one on each segment. Dorsum shaded with reddish and a little yellow just above the lateral black lines. The lines do not extend beyond joint 11, there being a black spot on each side of joint 12 and posteriorly on the last joint. An elevated black spot on top of joint 12, and one on each side of joint 5, the latter interrupting the two upper of the three lateral black lines. Venter with traces of a longitudinal black line. Thoracic feet red; claspers of abdominal feet reddish. Length, about 45 mm.

Pupa.—Enveloped in a thin, but somewhat tough cocoon, composed of silk and bits of earth &c., constructed at the surface of the ground. It is 23 mm. long, 6 mm. in diameter, shining dark chestnut brown ; cremaster short and blunt, terminating in several hooklets.

Food plant : Clover.

The duration of each stage was about four days, with the exception of the last which was six days. The eggs hatched August 17th and the larvæ ceased feeding September 6th. They became pupæ in a few days after constructing their cocoons and passed the winter in this stage. There are two broods of this insect in a season, those here described being of the second brood.

Two Beetles new to the N. A. Fauna.

By Wm. Jülich.

The swift and daily intercourse between Europe and this country has added two more species, only recently observed in this vicinity, to the quite extensive list of imported snout beetles. Four years ago Mr. H. B. Bailey found a number of *Strophosomus Coryli*, Fab., in the Orange Mountains in New Jersey, on the Cherry or Black Birch (*Betula lenta*, L.) and has taken them since then every year on the same clump of trees. They appear about the first of September, and through the month ; also a few specimens very early in the Spring, which fact seems to indicate that the beetle hibernates.

The Cherry Birch is very rarely found in this locality, in fact, I have seen only about 6 or 7 trees, besides the above mentioned group, from which I took about 6 specimens of *Strophosomus*, Sept. 9th, last year. The insect is very common in Europe and lives on all kinds of trees, especially Beach and young Hazel, and is not known as doing any damage. In order that it may be recognized I give the following description.

Strophosomus coryli, Fab. S. E., II, 524. Gyllh., Ins., III, 304, 32, and IV, 613, 32.

Black, covered very densely with light gray and brownish scales with metallic lustre. Beak very wide, flat, densely metallic punctured, with fine, distinct groove to base of head, eyes prominent, thorax coarsely not densely punctured with fine groove in middle, sides arcuate ; elytra oval, convex, angles rounded, striato-punctate, interstices with erect bristles, especially on sides and apex. Underside covered with dense, light gray scales and densely punctured, antennæ and legs rufous, the latter also covered with scales. Length, .16 to .20 inch. = 4 to 5 mm.

The second species is **Ceutorhynchus cyanipennis**, Illiger. Germar, Ins. sp., I, 235, 363. Gyllh., Ins, IV, 594, 134, 135.

Black, thorax constricted at apex with elevated margin, distinct groove on middle of coarsely and densely punctured disc, small tubercle on each side near base. Elytræ, bright metallic blue, striate, interstices with regular row of punctures. Underside, covered, not densely, with grayish white scales.

Length, .10 inch. = 2.5 mm.

Quite distinct from any of our species by its color. Eight or more specimens taken by Mr. F. H. Chittenden at Ithaca, N. Y., also taken near Baltimore by Dr. Otto Lugger. It is said to be found on grass.

It might be mentioned here that *Cryptorhynchus lapathi*, Fab., hibernates, like our other species of *Cryptorhynchus*, as I found several specimens under bark and chips in November and December last year.

The Larva of Gnophæla vermiculata, *G. & R.*

By T. D. A. Cockerell.

On the first of June, last year, I found the larvæ of this species feeding on *Mertensia* by Swift Creek, Custer Co., Colo., at about 8,200 ft. alt. From these I obtained moths early in July. I drew up a description of the larvæ and pupæ, which is rather fuller and differs in a few points from that of Mr. Bruce (Ent. Am., IV, 24), so give it here, at the expense of a little repetition, as the early stages in this genus are particularly important as establishing its relation to the Arctiid group. *Mature larva :*—Length, about 30 mm ; *head*, bright chestnut, the mouth parts black ; *body*, black, with sulphur yellow interrupted bands and steel-blue tubercles ; beneath pale green. The dorsal yellow band is the broadest, the subdorsal ones are reduced to the rows of elongated spots, while the lateral bands are cut up so as to produce a somewhat marbled appearance. (Perhaps these are hardly to be called bands, but their homology is such, and so I speak of them.) The blue tubercles are 12 on each segment, in three pairs on each side, those between the dorsal and subdorsal bands being the largest ; each tubercle emits some short whitish hairs. *Abdominal legs* blue-black and shiny above and externally, otherwise red-brown ; a black point at the base of each. *Cocoon :* a thin white meshwork, with many large holes. *Pupa :* 20 mm. long, head and thorax shiny black, shading off to a dark olive-brown over the wings. Abdominal segments chestnutty brown, marbled with yellowish spots. Each spiracle placed on a large elongated yellow patch, the narrow diameter of which is antero-posterior. Terminal segment

blackish, tipped with black bristles. Both in habit and appearance, the larva of *G. vermiculata* reminded me strongly of those of *Callimorpha dominula*, and a similar remark has been made by Lord Walsingham in regard to another species of the genus. I confess, I cannot see the resemblance to the *Acronyctæ* pointed out by Mr. Bruce, except in a most distant way. There is a rather smaller and different form of *Gnophala* found in Chaffee Co. in August: I fancied it might be distinct, but one sent to the Smithsonian Institute is named *G. vermiculata.*

To Free Breeding Cages from Disease Germs.

By Geo. D. Hulst.

In the vicinity of Brooklyn during the last few years there has prevailed a disease which has carried off not only the caterpillars many have endeavored to raise, but very often larvæ have been found in the open air dead or dying. Caterpillars seem to differ very much in their sensitiveness to the disease, but in confined boxes, where it has prevailed, all succumb to its influence. In the open air in the Autumn full grown caterpillars of *Saturnia* Io., may be some years seen hanging dead from the branches on which they have fed Last Summer I saw a field of grain almost devoured by the Army Worm *Leucania unipuncta,* when suddenly the disease appeared among them and in a day or two none seemed to be alive. The stalks and ground were however covered with dead caterpillars.

However much we may desire the disease in the open air to destroy injurious insects, we do not want it in our breeding boxes, to destroy our rarities.

How shall we rid ourselves of it? If the cages be made in part or all of wood we would advise their utter destruction.

If large numbers are to be raised use the open air and netting. If smaller numbers or rarities use glassware.

I am told by Mr. Hermann Meeske, who has done considerable experimenting that he has found no good results to come from washing with soap, benzine, alcohol or carbolic acid water.

The only successful way of destroying the seeds of the disease was to thoroughly boil the feeding cages. He found that the germs or microbes would withstand any temperature below the actual boiling point.

We give his experience to those who may have suffered from the disease as the writer has during the last 4 or 5 years.

A New Species of Pterostichus.

By Henry Ulke.

Pterostichus Johnsoni, n. sp.

Elongate, depressed, parallel, shining black with a feeble purplish lustre; prothorax quadrate, longer than wide, feebly narrowed behind, sides margined in their entire length and feebly sinuate, front angles rounded at tip, base sinuate, hind angles rectangular, basal impressions long, deep and linear, outer ones very small. Elytra shining in the ♂, nearly opaque in the ♀, feebly rounded on the sides, sinuate near the tip and separately rounded; humeri rounded, striæ very deep, impunctured, interstices rather costiform, 1st, 2nd, 4th, 6th and 8th equal straight, 3rd and 5th broader and seven or eight times interrupted; the space between the 8th and the margin is still a little broader and the interrupted 9th costa forms about 15 or 16 tubercles. Prosternum narrowly margined between the coxæ; posterior tarsi slender with the first and second joints grooved in their entire length. Abdomen smooth, shining, last ventral segment with a semicircular impression in both sexes, somewhat deeper in the ♂. Length, .65 to .67 inch = 17 mm.

Oregon, several specimens. Belongs to Dr. Leconte's first division near *planctus* and is distinguished from all the other species by its peculiar sculpture of the elytra, which recalls somewhat that of *P. punctatissimus*, Randall.

I take great pleasure in dedicating this beautiful species to my friend Prof. O. B. Johnson of the Washington University in Seattle, to whom entomological Science is indebted for the discovery of many new and rare species in Oregon and Washington Territory.

Entomologists of the Hatch Experiment Stations of the various States and Territories.

So far as we have been able to inform ourselves, the following is a list of the Entomologists connected with the Hatch Experiment Stations and their addresses.

Arkansas,—C. W. Woodworth, - - Little Rock, Ark.
Dakota,—L. H. Orcutt, - - - Brookings, Dak.
Delaware,—M. H. Beckwith, - - - Newark, Del.
Florida,—W. H. Ashmead, - - - Jacksonville, Fla.

We are not sure but Mr. Ashmead has resigned his position. His present address is 622 E St., Washington, D. C.

Georgia,—J. P. Campbell, - - - Athens, Ga.
Indiana,—F. W. Webster, - - - Lafayette, Ind.
Iowa,—C. P. Gillette, - - - - Ames, Iowa.
Maine,—F. L. Harvay, - - - - -
Massachusetts,—C. H. Fernald, - - Amherst, Mass.

Michigan.—A. J. Cook, - - Agric. College, Mich.
Missouri,—J. W. Clark, - - - Columbia, Mo.
Minnesota,—Hermann Oelrichs, - - - -
Nebraska,—Laurence Bruner, - - - Lincoln, Neb.
New Jersey,—John B. Smith, - New Brunswick, N. J.

Mr. Smith takes his position as N. J. State Entomologist April 1st. Till then his address will be National Museum, Washington, D. C.

New York,—J. H. Comstock, - - - Ithaca, N. Y.
Ohio,—C. M. Weed, - - - - Columbus, O.
South Carolina,—G. F. Atkinson, - - Columbia, S. C.

Society Meetings.

Brooklyn Entomological Society, Dec. 4, 1888.—17 members present. The final report of the Committee of Conference with the Brooklyn Institute was made and articles of agreement in which all that was asked by the Society was granted were read and adopted and the whole report then ratified. By this the Brooklyn Entomological Society, while retaining its corporate existence and property, becomes the Entomological Section of the Brooklyn Institute.

Mrs. Annie Trumbull Slosson was unanimously elected a member of the Society.

In view of the Lecture to be given before the Brooklyn Institute on Feb. 14th by Mr. Hulst on the subject "The Habits and Instincts of Insects," it was thought advisible that some display of insects should be made by the Society. The Curators were appointed a Committee to attend to the matter of soliciting loans of specimens from members and making arrangements for their proper display.

On motion Geo. D. Hulst was unanimously elected Editor and Chris. H. Roberts Assistant Editor of Entomologica Americana for the year 1889.

After adjournment a sale of insects for the benefit of the Society took place realising the sum of $26.05.

Meeting Jan. 8, 1889.—13 members present. The Treasurer reported for the year receipts $592.29, disbursements $582.44. Balance on hand $9.75.

The Editors, Librarian and Curators also reported the condition of affairs in their various departments.

Election of Officers for the year 1889 was then held resulting as follows: Pres., Capt. T. L. Casey, U. S. A.; Vice-Pres., Rich. E. Pearsall; Treas., Chris. H. Roberts; Rec. Sec., A. C. Weeks; Corr. Sec., F. H. Chittenden; Libr. Hermann Meeske; Curator of Coleoptera, F. H. Chittenden; Curator of other Orders, A. C. Weeks; Exec. Committee: Pres. and Treas., *Ex-Officio*; Chas. Palm, Gustav Beyer, G. W. J. Angell, Ottomar Dietz, Henry Edwards; Pub. Committee: Editors, *Ex-Officio*; A. W. P. Cramer, E. L. Graef, R. E. Pearsall, F. H. Chittenden.

A paper was read written by Mr. Pearsall entitled "Notes on Rearing Lepidoptera." A considerable discussion followed principally upon the importance of reproducing the conditions of nature to insure success in breeding. The general sentiment seemed to be that many conditions of nature were injurious and destructive and the one who breeds insects rightly can far surpass Nature by taking advantage of what is shown to favor and by freeing from what works injury. In other words not Nature, but Nature at her best only should be followed.

A. C. Weeks, *Rec. Sec.*

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The EPIPASCHIINÆ of North America.

By Geo. D. Hulst.

[Continued from p. 52.]

CACOZELIA, Grote.

(*Kakos*, evil, and *zelos*, emulation).

Grote, Proc. Bost. Soc. N. Hist., XIX, p. 264, 1877; Geol. Surv. Terr. Bull., IV, 687, 1878, N. A. Ent., I, 10, pl. 2, f. 3; Meyrick, Trans. Ento. Soc. London, April, 1884, 65, Trans. Ento. Soc. London, Sept. 1887, 187.

Palpi strong, exceeding head, scarcely ridged in front; end member short on end of 2nd. Maxillary palpi strong, end lobes equal, somewhat pencil-haired. Ocelli distinct. Antennæ somewhat serrate, doubly tritufted-pubescent basally and medianly, pubescent at end. Process strong, heavy, heavily clothed with rather long scales above and below and thus flattened, the upper scaling reaching down and about the base of the antennæ proper, thus making it to be set in a cup shaped fringing. Vestiture of wings less squammose than usual. Fore wing rather sharp at apex. Genitalia of ♂ having besides the normal armature, a strong inner curved hook or spur on each side. Legs, as usual except the hind tibiæ are stouter than ordinary and the spurs small, the upper pair very small.

Venation the same as *Epipaschia*.

Notwithstanding Mr. Meyrick places this as a synonym of *Stericta*, Led., I retain it as a good genus. Mr. Meyrick having only the incomplete diagnosis of Mr. Grote, which gave only characteristics which are found in *Stericta*, could not do other otherwise than as he did. The genus is not a strongly marked one; but the antennal process is so peculiar in shape and vestiture, the upper spurs on the hind tibiæ so nearly wanting, and the male genitalia so different that I still retain it.

C. basiochrealis, Grote, (*Cacozelia*), Proc. Bost. Soc. N. Hist., XIX, 264, 1877; Geol. Surv. Terr. Bull., IV, p. 687, 1878, N. A. Ento., I, 10, pl. 2, f. 3. 1879.

Palpi reddish rusty ocher, erect, surpassing head; end member quite short but distinct. Maxillary palpi with end members pineapple-shaped, equal in size, not very long haired. Fore wings rusty-ochreous. Interior line double, arcuate, rusty-brown; basal space ochery. A costal dark dot surmounting a faint concolorous-ringed discal mark; median field light stone-gray; median shade visible as a patch of dark, slightly raised scales. Posterior line rusty, double, inclosing a whitish shade, most distinct on costa, of the usual shape. Subterminally the wing is brown, washed with gray on external margin. A fine, terminal, dark line on both wings. Hind wings yellowish-gray, with a fine, denticulate, exterior line. Beneath ochreous; costa at base brown. Head and appendages ochreous; beneath, the fore and middle tibiæ are purplish; hind legs dotted with brown.

Tex., Colo. I have specimens from Texas taken in July and others taken in September, so that the species is probably double brooded.

STERICTA, Led.

(*Steridzein*, to be established).

Lederer, Wiener Monats. VII, 340, 1863; Meyrick, Trans. Ent. Soc. London, April 1884, 66; Trans. Ent. Soc. Lond., Sept. 1887, 187.

Glossina, Guen., Pyr. 124, 1854.

Toripalpus, Grt., Proc. Bost. Soc. N. Hist., XIX, 265, 1877; Geol. Surv. Terr. Bull. IV, 688, 1878; N. A. Ent., I, 10, pl. 2, f. 4; Meyrick, Trans. Ento. Soc. Lond., Sept. 1887, 187.

Winona, Hulst, Ento. Am., IV, 113, 1887.

Practically the same as *Epipaschia* except that the maxillary palpi in the males are pencillate tufted. There is also a decided shortening of the antennal process in the species. There is moreover no tendency to furcation in vein 1 of the fore wings, the vein being nearly straight to the base and thus not showing the tendency to furcation which is evident in a decided bending of the vein at base.

SYNOPSIS OF SPECIES.

1 Fore wings ocher yellow and fuscous ..... **incrustalis**

Fore wings with more or less of reddish; cross lines distinct, basal strongly two waved, basal space shaded with reddish, middle field whitish fuscous gray, outer lines distinct, bent outward and angulated at middle..... 2

2 Basal field dark fuscous; within the basal line a subparallel black dash; hind wings dark fuscous..... ..... **breviornatalis**

Basal field whitish, washed with reddish; middle field nearly white; hind wings light fuscous..... **trabalis**

S. incrustalis, Hulst, (*Toripalpus*), Ento. Am. III, 130, 1887.

Palpi rather slender, considerably exceeding front, end member pointed, prominent. Maxillary palpi small. Fore wings light ocher, washed and spotted with ocher fuscous, with a black point of raised scales at middle of base and on disc.

Basal field quite dark. Basal line of ground color indistinct but shown by the darker shadow lines. Middle field quite clear inwardly, ochery fuscous outwardly, this color divided by the veins which are light ocher. Outer line parallel with outer margin, waved inwardly, dentate outwardly. Outer fields ochery fuscous, lighter on veins. A marginal row of black points. Hind wings even fuscous, lighter towards base, with a marginal black line. Beneath fuscous with a reddish shading except on inner margins, the reddish being especially marked along costa of fore wings. Expands, 25 mm.

Venation the same as *E. superatalis*, except that 7 and 8 of the hind wings are stemmed.

Colorado. I continue this under *Stericta*, though it can not be be determined whether it belongs there or under *Epipaschia* until the male is known.

S. breviornatalis, Grote, (*Toripalpus*) Proc. Bost. Soc. N. Hist. XIX, 265, 1877; (*Toripalpus*), Geol. Surv. Terr. Bull. IV, 688, 1878; (*Toripalpus*), N. A. Ent., I, 10, pl. 2, f. 4, 1879.

This species is characterized by the antennal appendages being extremely short, hardly exceeding the collar. The labial palpi are longer, and the antennæ are much more lengthily ciliate compared with *Epipaschia*. The ornamentation, but not the color, is like *zelleri*. Fore wings reddish brown at base to the inner line, which is dark brown, preceded by a dark shade with raised scales, slightly outwardly produced on costa and submedially. Inner portion of median space washed with white on costal region and anteriorly. A discal dot. The outer line is dark brown, denticulate, produced over median nervules, whence it runs obliquely inwardly to internal margin. It is followed by a whitish corresponding shade-line. Terminal space washed with brown, becoming whitish before the margin. The outer line is situated much nearer the outer margin than in *zelleri*. A terminal dotted line distinct on hind wings. These latter are pale fuscous, with an outer dentate line followed by a white shade more or less noticeable. Terminal palpal joint marked with black, tipped with pale. Head and appendages reddish-brown; thorax becoming pale behind. Beneath, the wings are reddish-brown, becoming paler inferiorly. A common exterior line near the margin, and corresponding with the exterior lines on upper surface in shape. Fringes pale, obsoletely interlined. On hind wings beneath, a discal point. Expands, 25 to 30 mm.

Southern States, Texas, Colorado.

S. trabalis, Grote, (*Toripalpus*), Pap. I, 18, 1881.

As compared with *breviornatalis* which this species very much resembles and of which it is possibly a variety this species is much lighter in color, and shows a greater inclination to reddish. The inner part of the basal field and the greater portion of the middle field are powdery whitish, the hind wings being lighter fuscous than its congener. Expands, 25 to 30 mm.

Texas, Colorado.

ONEIDA, gen. nov.

(*Oneida*, an Indian tribe of Central New York, one of the Six Nations).

Labial palpi erect, much exceeding head, 2nd member long, end member short. Maxillary palpi invisible. Antennæ with pubescence longer than usual. Process

long scaled beneath and on end, short scaled above, reaching to the thorax. Wings without fold or vitrifaction. Tarsi all spinulated. Epiphysis prominent. Hind legs with end pair of spurs only in ♂, both end and middle pair in ♀. Genitalia normal. Abdomen tufted laterally on ante- and penultimate segments in ♂. Venation—Fore wings 12 veins. Vein 1 bent, not furcate; 4 and 5 short stemmed; 6 stemmed at base with 7, 8 and 9; 10 and 11 separate. Hind wings 8 veins; 3 separate; 4 and 5 stemmed; 6 and 7 stemmed; 8 joined with 7 beyond point where 6 separates. Cell longer than usual, nearly or quite $^1/_2$ wing.

I use this name as a generic name, following the example of Mr. Ragonot in some of his diagnoses of the *Phycitidæ*, and as well my own previous custom. It seems to me as appropriate under any circumstances to give insects the names of our N. A. Indian Tribes, as to give them the names of the ancient tribes and cities of Greece or Rome, and far more appropriate in case of N. A. Insects. And it also seems to me to be at least as appropriate to give these, as to give sesquipedalian polysyllabics, manufactured from words which the Greeks ought to have had in their language, if, as in many instances, they did not. It seems a pleasant fancy to see the spirits of the ancient dwellers of the American forests and plains still wandering in "night's shades," in the moths, the phantoms of the forest, mountain, and glen.

The armature of the hind tibiæ of this genus is remarkable, and at the writing of what was published last month had not yet been noticed. My number of specimens is small, and I can not further verify my observations, and I would hardly assert the facts were it not that in *Cacozelia* the upper pair of spurs is almost obsolete, and in the next genus *Yuma* the upper pair of spurs is certainly wanting.

O. lunulalis, Hulst, (*Toripalpus*), Ento. Am., III, 130, 1887.

Expands, 22 to 25 mm. Head and color yellowish brown, strongly washed with violet. Palpi brownish gray or yellowish gray in front, strong, recurved over head, scale tufted at end of second member, end member fine, distinct. Maxillary palpi very small, the end member set on the side but near the summit of the member next below, all invisible under ordinary observation. Ocelli very distinct. Antennal process short. Front of head rather heavily scaled, collar also run in somewhat of a ridge. Thorax dark fuscous. Abdomen light fuscous, the segments ringed with dark fuscous, extremity tufted in ♂ with lateral tufts on 2 segments preceding anal segment. Fore wings much rounded at apex, generally light even blue gray in color with a strong shading of fuscous on basal and outer fields. A dark broken cross line close to base not always distinct; near the outer edge of the field a dark line consisting of lengthened and raised scales, and extending quite across the wing. The line limiting the field is very indistinct and is evidenced rather by its hardly distinct shade lines. Middle field with three raised scale tufts, one discal small, the second extra-discal, more prominent and lengthened, the latter shaded outwardly, with fuscous, and a third near center of the field one-third from inner margin, black. Outer line quite distinct near costa, becoming obsolete posteriorly, shaded as usual, this shading being broad and diffuse near costa and outwardly occupying the whole apical space. The outer line forms a large sinus from the costa, and this with the shading and posterior obsoles-

cence gives a distinctly lunular appearance to the apical markings. Outer field anteriorly fuscous divided by the yellow fuscous color of the veins—fading into the ground color posteriorly. Hind wings fuscous, smooth, dark at margin. Beneath fuscous on fore wings with a costal band lighter, the whole with a reddish tinge quite marked at apex. Hind wings reddish at angle, otherwise fuscous.

Can., N. Y.

YUMA, gen. nov.

(*Yuma*, a tribe of Indians of S. California).

Less robust than the other genera. Head comparatively small. Palpi long, curved back over head, heavily ridge scaled in front, thus becoming flattened, second member long, third short. Maxillary palpi long, pencil tufted in ♂, the lobes slenderer than usual, the antepenultimate member long filiform. Antennæ strongly bi-tufted pubescent, the tuftings on the basal and middle segments raised on slight protuberances $^1/_4$ the diameter of the segment, showing a beginning of pectination; process short, slender, long scaled, without hairs. Wings without costal fold or vitrifaction. Abdomen slender, tufted laterally on anti- and penultimate segments. Genitalia normal, except that there are strong short lateral spines. Legs long, slender, hind tarsi only slightly spined at tips. Fore tibiæ with epiphysis rather heavy, first tarsus longer than tibia. Middle tibiæ not so long as femora, spurs long, the outer very long, equalling $^2/_3$ tibia. Hind tibiæ with end pair only of spurs, the tibiæ being twice the length of femora. Venation—Fore wings 12 veins; 1 not bent nor furcate, 3, 4 and 5 separate, 6 and 7 from a point, 9 and 10 stemmed with 8, 10 and 11 separate. Hind wings 8 veins; 3 separate, 4 and 5 joined at base, 6 separate, 7 and 8 stemmed beyond cell. Cell long, $^1/_2$ length of wing.

Y. adulatalis, Hulst, (*Toripalpus*), Ento. Am., III, 129, 1887.

Expands, 20 to 26 mm. Head black with light gray scales intermingled. Tongue light gray. Palpi black and gray intermixed, both washed with reddish. Process whitish at base, becoming blackish at end, long scaled. Ocelli very distinct. Thorax reddish brown in front, gray behind. Abdomen gray, blackish at base, with lateral scale tufts on the 2 segments preceding anal segment. Wings on the basal field dark brown mixed with gray scales with a longitudinal light gray dash in center, running two-thirds the length of the field and ending in a black point of raised scales preceded by another. The field is limited quite distantly from base by a light gray strongly thrice waved line which has beyond it a shadow line of dark brown. Beyond this the middle field is gray, very light costally and centrally, darker posteriorly. Anteriorly slightly washed, and shaded with a black discal point of raised scales, posteriorly strongly shaded with brown which at the outer edge of the field is slightly reddish. The light gray centrally extends to the outer margin of the wing. Outer line clear at costa, shaded inwardly and outwardly with black, the outward shading making a large apical blotch. The line ends at the extension of the gray central field $^1/_4$ from costa in a black longitudinal dash. It shows somewhat indistinctly on the posterior $^1/_3$ in the continuation of the reddish brown of the middle field, and is there waved inwardly, dentate outwardly, and shaded on both sides with blackish. Outer field narrow, gray, except towards posterior angle where it is brown, slightly reddish. A black marginal line cut by the veins. Fringes interlined. Hind wings yellowish-white, somewhat fuscous, subpellucid. An outer line dentate outwardly on veins. A black marginal line cut at veins. Fringes interlined. Beneath dark fuscous washed over dirty white, an outer indistinct dentate white line on fore wings. Hind wings nearly as above but duller.

S. Cal., Tex. The Texas specimen was taken in October at light.

LANTHAPHE, Clem.

(Derivation unknown to me).

Clemens, Proc. Acad. Nat. Sci. Phil., June, 1860, 207.

Palpi of ♂ long, slender, smooth, somewhat recurved, end member small. Palpi of ♀ long, slender, end member long, conical, 1/3 second member. Maxillary palpi bilobed, pencil tufted, the lobes large, heavy, the pencilling long, reaching above head. Antennæ very slightly pubescent, process short, long scaled. Fore wings strongly arched along costa. Along costa beneath in ♂ a fold of transverse scales with vitreous spot partially covered beneath, this spot also showing on the upper surface. Legs, tarsi all spinulated, of fore legs at tip only. Fore tibiæ longer than tarsus, epiphysis short, small. Hind tibiæ with 2 pairs of spurs, the upper pair just below middle. Venation—Fore wings ♂ 11 veins; 1 bent, notched or furcate, 2 and 3 much bent, 3 and 4 separate from end of broad and swollen post median, 6 long waved in discal space, 7, 8 and 9 stemmed, 10 and 12 separate, but closely pushed together, 9 wanting. Fore wings ♀ 12 veins; 4 and 5 short stemmed, 6 on a short stem with 7, 8 and 9; 10, 11 and separate, 1 bent and notched. Hind wings, ♂ ♀, 3 separate, 4 and 5 stemmed, 7 and 8 stemmed, 6 separate. Abdomen with short tufts laterally on penultimate and antipenultimate segments.

L. platanella, Clem.

Clemens, Proc. Acad. Nat. Sci. Phil. June, 1860, 207. Grote, (*Tetralopha*), Geol. Surv. Terr. Bull. IV, 691, 1878. Hulst, (*Lanthaphe*), Ento. Am., IV, 114, 1887.

Labial palpi pale brownish-red, touched in front with pale gray. Head and thorax brownish-red, the latter varied with grayish and dark fuscous. Fore wings grayish-fuscous, with the costa touched with brownish-red, and a patch of the same hue in the female, near the base of the inner margin containing a tuft of raised scales; in the male, blackish-brown, touched with brownish-red. The base of the wing is whitish. In the middle of the wing is a broad white band, obsolete toward the costa, with two straight blackish-brown lines internally with the same hue. The subterminal line is irregular and whitish, dark-margined internally. The hinder margin of the wing is touched with blackish brown. Hind wings pale brown, somewhat darker toward the hinder margin. The larva is tortriciform in appearance. Head pale brown, mottled with whitish. Body with isolated hairs, pale green, with a dark brown dorsal line and a fainter stigmatal line of the same hue, or pale reddish, with a brown dorsal line on each side of the vascular. It makes a web on the under surface of the leaf of Sycamore (*Platanus occidentalis*), drawing it together and living within a silken tube. The cocoon is woven on the surface of the ground, in form of a flattened oval, consisting of brown silk covered exteriorly with grains of earth. The larvæ remain in it unchanged during the winter. It may be taken in July, and enters the pupa state during the latter part of August, to appear as an imago in May or June. Expands, 20 to 25 mm.

Eastern U. S. This is Clemens' description. Neither he nor Mr. Grote was aware of the variation of the sexes in venation.

SALUDA, Hulst.

(*Saluda*, a tribe of Indians of the Southern States).

Hulst, Ento. Am., IV, 113, 1888.

Palpi of ♂ heavily scaled, recurved over head, reaching back of collar, second member very long, end member very short in front of end of second member; ♀

erect, end member comparatively long. Maxillary palpi pencil-tufted, the bilobed members heavy, long, the penciling very long and heavy. Antennal process short, long scaled. Wings with heavy costal fold and vitreous spot beneath in ♂. Legs rather heavy, loosely scaled, tarsi spinulated, on fore legs only at tip. Genitalia with furcate base of uncus curved upward. Venation as in *Lanthaphe*, but 6 is separate in fore and hind wings, and 10 and 11 are stemmed in the fore wings.

I am not altogether certain this venation is constant, so far as vein 6 is concerned. The specimens I have examined vary so much that others may be found to correspond with *Lanthaphe*. In that case the genus would rest on the stemming of 10 and 11 in the fore wings.

SYNOPSIS OF SPECIES.

Basal field gray, lines generally indistinct, outer one bent dentate.....**asperatella**
Basal field blackish or black, lines distinct, basal straight or a little rounded, double, the outer curved, even.....**melanogrammos**

S. asperatella, Clemens.

Clemens, (*Lanthaphe*), Proc. Acad. Nat. Sci. Phil. June, 1860, 207. Grote, (*Tetralopha*), Geol. Surv. Terr. Bull. IV, 691, 1878. Hulst, (*Saluda*), Ento. Am., IV, 113, 1888.

Labial palpi blackish-brown, varied with whitish. Thorax pale grayish, varied with grayish or dark gray. Fore wings dark brownish-gray, with a blackish-brown tuft of scales in the basal part of the fold, and a smaller one of the same hue on the disk above it, a whitish median band, sometimes almost obsolete, containing on the disk a small blackish-brown tuft in the female, with an internal crenated blackish line, and shaded toward the base with blackish; on its external margin is a line of raised scales. The subterminal line is pale grayish, angulated and margined internally by a blackish line, and externally by a fainter one produced into points on the nervules. The hinder marginal line is black. Sometimes in the female base of the wing is whitish, slightly touched with luteous. Expands, 22 to 27 mm.

Can., Eastern U. S. to Texas. Feeds, I have been told, on Locust. Taken in Texas, in August.

S. melanogrammos, Zell. (*Tetralopha*), Verh. Zool. Bot. Ver., p. 546, pl. 3, f. 24, *a*, *b*, 1872. Grote, (*Tetralopha*), Geol. Surv. Terr., IV, 689, 1877.

Diluculella, Grote, (*Tetralopha*), N. A. Ent., I, 60, 1880, l. c. 68, pl. 5, f. 10, 1880. (*Tetralopha*), Geol. Surv. Terr. Bull., VI, 589, 1880. (*Tetralopha*), Dept. Agric. Rept. 1880, p. 263.

Talleolalis, (*Toripalpus*), Hulst, Trans. Am. Ent. Soc., XIII, 160, 1886; Ento. Am., III, 22, 1887.

Head, palpi and thorax dark fuscous gray, the thorax with a very slight tinge of russet. Abdomen yellowish fuscous, interlined on segments with dark fuscous. Wings dark fuscous, light at base and on middle field. The basal cross line double, black, oblique, rounded slightly, sometimes almost straight. Base within the lines with a reddish shade and a black indeterminate line near middle of basal field. Middle field generally much lighter gray, especially basally. Outer line even, bent beyond cell,

edged outwardly with light gray. Marginal line black, broken. Hind wings dark fuscous.

Fla., Texas. Probably everywhere in East and South.

The determination of this insect as above is I think the correct one. Zeller's type was smaller than the type of *diluculella*, Grt., but the figure Zeller gives, and the type in the Cambridge Museum allow no other determination as it seems to me. There is a great deal of variation in the depth of coloring in the species, and *diluculella* might stand as a varietal name for the form with the black basal field. The insect is 2-brooded in Texas and the varieties incline to be seasonal, *diluculella* being the larger and darker Summer brood. *Talleolalis* is a synonym of the type form.

Prof. Comstock, in Dept. Agric. Report, 1880, gives a history of the insect as follows:

"*Larva*.—Length when full grown 20 mm., cylindrical, slightly tapering posteriorly and quite stout, of a dull greenish yellow color, somewhat paler beneath, with a narrow black stripe on each side about twice the width of the last, and equally distant from it and the middle of the dorsum. This stripe extends from the thoracic to the anal plate. The head, thoracic and anal plates are of the same ground color as the body. Eyes and end of mandibles black; several irregular black bands on each side of the head, extending from the posterior side forward to about the middle; thoracic and anal plates with a few scattered brown dots, the latter with an irregular row of black points across the anterior side.

Pupa.—Length 11 mm., robust, light brown, rounded at both ends, the posterior armed with a cluster of fine hooks; the abdominal segments are covered with coarse punctures except on the posterior edge. Wing covers extend to the end of the 4th abdominal segments."

"Some of the terminal twigs of pine (*Pinus taeda*) infested by the larvae of this insect where collected by myself in January, 1880, near Jacksonville, Fla. The appearance of these infested twigs is somewhat striking; the leaves around the end are loosely held by threads of silk, which also holds the excrements of the larva in a more or less irregular mass, varying from 1 to 3 inches in length and from 1 to 2 in thickness.

The larva is about eight-tenths of an inch in length, rather stout, of a greenish yellow or drab color, with two very distinct, quite broad black dorsal stripes, and a narrow one on each side.

When mature the larva descends to the ground, where it spins a loose cocoon of yellowish brown silk, to which is attached a covering of grains of sand or other loose materials, and within which it transforms to a pupa, in which state it passes the winter.

The moths from the larvae mentioned above emerged during the following April."

Taken in Texas in April and Aug. and consequently two-brooded.

TIOGA, Hulst.

(*Tioga*, a tribe of Indians of New York and Pennsylvania).

Ento. Am., IV, 113, 1888.

Palpi long, thin, scaled, extending much above head. 2nd member very long, end member short in ♂; end member in ♀ slender, pointed, quite long. Maxillary palpi pencil tufted. Process short. Wings in ♂ as usual, with scale pad and vitreous spot beneath, the vitrifaction small. Legs—tarsi spinulated at tip only. Tibial epiphysis short, small. Spurs of middle and hind legs long, the hind tibiæ having two pairs. Venation—Fore wing 11 veins; ♂ with, it seems to me, 11 wanting; otherwise much after the pattern of *Lanthaphe*, but 2 and 3 are slightly bent and the lower median is not much swollen. ♀, 1 furcate near base, 3 near angle, 4 and 5 from a point, 6, 7, 8 and 9 stemmed, 11 wanting, 10 and 12 separate. Hind wings, 3 close to angle, 4 and 5 stemmed, 6 widely separate, 7 and 8 stemmed beyond cell. Cell short.

T. aplastella, Hulst.

Hulst, (*Tioga*), Ento. Am., IV, 113, 1888.

Expands, 18 to 20 mm. Head light gray; antennæ dark fuscous; thorax blackish gray; abdomen yellowish brown; base of each segment blackish; fore wings light gray; basal field blackish, limited by a light gray cross line edged with black on either side; basal half of middle field of ground color, outer half fuscous; outer line light gray, edged within with black; outer field fuscous; veins lighter, a row of submarginal black spots; hind wings yellowish brown, blackish along edge.

Texas, April. This has very decidedly the appearance of *Hemimatia scortialis*, Led., but the maxillary palpi are present and distinct, while in *Hemimatia* they are wanting. On this account also *Hemimatia* can not be *L. diluculella*, Grote, which also it resembles.

TETRALOPHA, Zell.

(*Tetra*, four, and *lophe*, crest).

Isis, p. 880, 1848. Grote, Geol. Terr. Bull., IV, 688, 1878, N. A. Ent. I, 10, pl. II, f. 5, 1879.

Wanda, Hulst, Ento. Am., IV, 114, 1888.

Katona, Hulst, Ento. Am., IV, 113, 1888.

Loma, Hulst, Ento. Am., IV, 113, 1888.

In all respects very much the same as *Tioga*, except that in fore wings 1 is never furcate, and in ♀, 6 is separate from 7.

In view of the radical difference in venation between ♂ and ♀ and the variability of 4 and 5 in both wings, I established a number of genera, which further study has led me think must all be referred to *Tetralopha*.

SYNOPSIS OF SPECIES.

1 Basal line double distinct 2
Basal line indistinct, single 3
2 Basal field of fore wings reddish; hind wings dark fuscous ..... **nephelotella**
Basal field of fore wings gray; hind wings light fuscous ..... **robustella**
3 Outer field of fore wings reddish ..... **baptisiella**
Outer field of fore wings gray 4

4 Posterior margin of fore wings within basal line with reddish oval spot...**militella**
Without reddish spot.....5
5 Middle field of fore wings with heavy dentate black line from cell to posterior margin. Hind wings dark fuscous.....**tiltella**
Middle field of fore wings with a central black tufting; hind wings light pellucid fuscous.....**euphemella**

T. nephelotella, Hulst, (*Loma*), Ento. Am., IV, 114, 1888.

Expands, 25 mm. Head light gray, slightly reddish brown on summit; thorax and abdomen light yellowish brown, the segments of abdomen fuscous at base; fore wings reddish brown at base, with a central dark dash, and dark along inner margin; basal line whitish, edged both sides with blackish, slightly outwardly oblique towards inner margin, slightly rounded with angle inwardly at middle; middle and outer fields dark fuscous; outer line lighter, edged within with blackish; hind wings dark fuscous.

Penn.—I have this in the ♀ only. It is in appearance very much like *S. asperatella*, Clem., but it has 11 veins in the ♀. If the ♂, as is possible, lacks the costal fold and aberrant venation in the ♂, *Loma* will stand as a good genus.

T. baptisiella, Fernald, (*Tetralopha*), Ento. Am., III, 128, 1887.
Hulst, (*Wanda*), Ento. Am., IV, 114, 1888.

Wings, ♂ light fuscous with a slight ocher tint, heavily marked with darker fuscous on the costal region, running from a point on costa at base, along and parallel with the inner margin to outer cross line forming a triangular space, the lighter ground color showing distinctly between the veins. Inner cross line obsolete, or showing in a faint curved gray shading. A black point of raised scales at middle of basal field. Outer cross line $^3/_4$ out; sub-parallel with outer margin except a bend outward towards posterior angle, straight at costa, otherwise evenly dentate wavy. On the middle field just out from the first cross line is a cross line of lengthened scales whiter than the ground color. Outer field fuscous, lighter posteriorly and at veins. A marginal row of lengthened black points. Fringe grayish fuscous interlined. Hind wings fuscous with faint indications of outer lighter band. ♀ with lines as in the ♂ but basal field much lighter, the central cross band of long scales almost white, and the rest of the wing washed with russet ocher, the veins on the outer middle field blackish. A narrow gray shading next the marginal black points. Hind wings as in ♂. Beneath, ♂, ♀, fuscous on costal half of fore wings, light ocher fuscous, otherwise with faint outer band on all wings.

Food plant, *Baptisia*. May. Hab.—N. Y., Mo.

T. tiltella, Hulst, (*Wanda*), Ento. Am., IV, 114, 1888.

Expands, 20 mm. Head, thorax and fore wings gray, peppered over with black scales, giving a general blackish gray color; basal space somewhat darker than the rest of the fore wings; at the middle of basal field a jet black cross-line not reaching costa or inner margin; inner line light gray, three times dentate inwardly; at the middle of the middle field is another yet black cross line extending from inner margin nearly to discal spot; outer line straight from costa angulated outwardly, then rounded, wavy dentate, returning near inner margin, then with a single bent reaching the margin. Hind wings dark fuscous.

Hab.—Tex. June, July, August.

T. robustella, Zeller, (*Tetralopha*), Isis, 881, 1848. Grote, (*Tetralopha*), Geol. Surv. Terr. Bull., IV, 690, 1878.

Head and thorax fuscous gray, abdomen yellowish. Fore wings cloudy fuscous gray with a slightly russet shading at times. Middle field lighter, just beyond basal line often light gray. A cross band of larger scales on basal field rising into a black tufting near middle. Another near middle of middle field, often forming a dentate black line, sometimes only scattered black dots, this scale ridge also with 2 or 3 tuftings. Outer line quite even, strongly bent. Hind wings light pellucid fuscous, outer line evident darker fuscous. Expands 18 to 25 mm.

Central Texas, August. I have not been able to examine the venation of this insect but have little doubt it belongs to *Lanthaphe* rather than *Tetralopha.* As determining *Tetralopha* I take the first species described under it, viz: *militella*, Zell., as the type of the genus.

T. militella, Zell. Isis, 880, 1848. Grote, Geol. Surv. Terr. Bull., IV, 689, 1878.

Head and thorax fuscous gray. Fore wings with very convex fore margin, obtuse apex and rounded posterior angle. Color fuscous gray, washed slightly with russet, lines rather indistinct, the outer bent and dentate beyond cell, with light gray edging outwardly. At outer part of basal field along inner margin an oval reddish spot surmounted with a black scale tuft; generally also a russet shading at posterior angle. Hind wings dull fuscous. Abdomen yellowish fuscous, basal segment blackish, the others annulated with darker and lighter coloring.

Central Texas, August.

T. euphemella, Hulst, Ento. Am., IV, 114, 1888.

Expands, 17 mm. Front dark gray; antennæ blackish; thorax dark blackish gray; abdomen yellowish fuscous; fore wings light gray, more or less overlaid with black; base gray; basal line black, diffuse, dentate, edged outwardly with a band of blackish gray; outer line white, straight at costa and inner margin, bent outwardly and sinuate between; discal points distinct black; outer space gray with apical dash of blackish; tufts blackish gray, or blackish; hind wings light fuscous, fuscous on veins; beneath light fuscous gray, the markings above faintly produced.

Central Texas, March. Possibly not really distinct from *T. tiltella.*

ATTACAPA, gen. nov.

(*Attacapa*, a tribe of Indians of Louisiana and Texas).

Very much as in *Tioga*, but the antennal process is entirely wanting, the basal member being merely swollen posteriorly. Venation—11 veins; ♂ as usual, but the inner median is very little swollen, and the vitreous spot almost or quite lost, 1 not furcate at base. ♀, 1 not furcate, 3 separate, 4 and 5 long stemmed, 6, 7, 8 and 9 stemmed. Hind wings, 3 at angle separate, 4 and 5 long stemmed, 6 at a point with 7, 7 and 8 stemmed beyond, cell small.

A. callipeplella, Hulst, (*Tetralopha*), Ento. Am., IV, 114, 1888.

Expands, 16 mm. Palpi, head, antennæ and thorax uneven fuscous gray; fore wings gray, rather strongly overlaid with blackish, more especially on the basal field; extreme base and posterior portion of basal field reddish; basal cross-line white, slightly waved, distinct, edged on both sides with distinct fine black

lines; discal spots black; outer line gray, straight from costa, then rectangular outward, then rounding forming a deep sinus shorter than usual, then angulate and slightly bent to inner margin; veins on middle and outer fields rather darker than ground color; marginal line black; hind wings light fuscous, darker on the outer margin.

Hab.—Texas.

While writing the first part of this article, published last month, I thought it wise in view of doubts existing in my mind not to place in the list a species (*Tallula atrifascialis*) described by me as one of the *Epipaschiinæ*.

I have been able by the sacrifice of one of my types to carefully study the species since and have concluded that it must be catalogued as one of the *Epipaschiinæ*. I therefore add it, merely noting my opinion that it would be best placed after *Yuma*, and before *Lanthaphe*.

TALLULA, Hulst.

(*Tallula*, Indian name in Texas).

Ento. Am., IV, 114, 1888.

Palpi erect, long, thin; end member comparatively long. Maxillary palpi present, not bilobed, but end member nearly at summit of 2nd. Antennæ heavily bitufted pubescent in both sexes, but more prominently in ♂. Process almost obsolete. Tongue strong, clothed with long scales in front at base. Wings with scale ridges and tuftings, without costal scale ridge and vitrifaction beneath; apex somewhat sharper than usual, ♂ genitalia normal, with furcate base of uncas bent upward. Legs—tarsi spinulated, hind tibiæ with 2 pair of spurs. Venation—fore wings 12 veins; 1 bent, not notched, nor furcate, 3 close to angle, 4 and 5 short stemmed, 6 at a point with 7, 7, 8 and 9 stemmed, 10, 11 and 12 separate. Hind wings 8 veins; 3 close to angle, 4 and 5 short stemmed, 6 short stemmed with 7, 7 stemmed with 8 beyond separation from 6; cell short.

Notwithstanding the 12 veins of the fore wings, this species is very closely allied to the *Phycitidæ*. But, as the result of careful study I think now that it must be placed with the *Epipaschiinæ*. The lack of bilobing in the maxillary palpi is the most serious objection to such a reference, and the antennal process is almost obsolete, but otherwise its affinities are here. Still the end member of the maxillary palpi is not on the summit of the next and the process is clearly indicated.

It does not seem to me the difficulty would be lessened by referring it to the *Pyralidinæ*, but rather much increased.

It has been suggested to me that this species might be *Anæglis dismissalis*, Led., since Lederer's figure very strongly resembles it. But *Anæglis* has neither tongue nor ocelli, apart from differences in venation.

The original generic description was faulty owing to a poor preparation for study. The above corrected diagnosis can, I think, be relied upon.

T. atrifascialis, Hulst, (*Tetralopha*), Trans. Amer. Ento. Soc., XIII, 160, 1886; (*Tallula*), Ento. Am., IV, 115, 1888.

Expands, 18 to 22 mm. Palpi white, black at ends; head, thorax and antennæ pure white, with some black scales intermixed; thorax with three black spots posteriorly; fore wings pure white, more or less heavily mixed with black scales, giving a snowy cinereous aspect; a black costal spot at base; the first line black, broad at costa, then constricted nearly or quite separated at middle, then broadening to margin, following inner margin to base in a fuscous shade; outer line white, sinuous, lined within with fuscous; a large, black, costal, apical triangle; black points on either side of outer line on inner margin; a marginal line of black dashes; fringe white, interlined brokenly with black; hind wings light fuscous, black marginal line; fringe as fore wings; beneath, fuscous on fore wings and anterior margin of hind wings; fringe as above. Abdomen cinereous, annulate with fuscous.

Southern States and Texas. October.

On page 47, 10th line from the bottom, there is an important error, "coalescing of 10 and 11," should be "8 and 9." And on page 45, 7th line from the top, "*Oneida lunulalis*" should be "*Yuma adulatalis.*"

Tetralopha enthealis, Hulst, Trans. Am. Ent. Soc., does not belong here. The type is a female, and is probably a synonym of *Aglossa domalis*, Guen., though very decidedly differing in shape of wings from all females of that species I have seen.

It may be that Mr. Walker has described some of our species in the British Museum Catalogue. But so far, no way has presented itself by which I could make reliable comparison with Walker's types, and nothing can be determined from the descriptions.

In the introductory part of this article I have shown that in the most of respects the *Epipaschiinæ* find correspondences among the *Phycitidæ*. The principal and almost only material point in which there seemed to be a distinction was in the frenulum, which in the ♀ of the *Epipaschiinæ* is double, while in the *Phycitidæ* it is single. I had felt certain that even this was not absolute in view of the peculiar formation of the frenulum in the ♀ of the *Phycitidæ*, but at the time of writing was able to give no proof. Among the *Phycitidæ* the ♂ has the single heavy spine; the ♀ also has one spine but it consists of two, or more generally, 3 or 4 joined together. This is very evident at the base where the separate sockets are easily seen, and there is morever a flatness and waviness of the basal portiou to correspond. After the examination of various specimens I have at last found an undoubted ♀ *Anerastia tetradella*, Zell., in which the frenulum is divided to the base, and is therefore double as in the *Epipaschiinæ*.

In addition I have made some comparative observations on the females of the *Epipaschiinæ* and *Phycitidæ*. So little has been said (if anything at all) upon the genitalia of the females in any family that I

made no observations. I find however, as the result of my study since, some interesting facts. The female genitalia in the *Epipaschiinæ* have a certain specialization for the purpose of oviposition. The last two segments are provided with an extensile apparatus, consisting of a chitinous projection within and on either side of the oviduct. Those of the last segment control the end of the ovipositor, which is somewhat spatulate covered with stout hairs, the opening being underneath the spatulate portion. Those of the penultimate segment control the last segment. These give not only an extensile power, but act through the muscles in propelling the egg to the end of the abdomen. This structure is essentially the same in the *Phycitidæ*. It also exists in the *Galleriidæ*, in the ♀ of some of which the extensile apparatus is very long, enabling the insect to double the length of the abdomen.

I find also on some of the insects in the female a couple of stout projecting spines on the underpart of the abdomen. These are pretty close together in *T. tiltella* and on the antepenultimate segment; in *T. aplastella* wider apart on the second segment anterior to that. These are probably used in assisting the newly emerged imago from the cocoon.

In view of the above I reiterate my opinion that the *Epipaschiinæ* and *Phycitidæ* are very nearly allied and am strongly inclined to believe the *Epipaschiinæ* should be regarded as a subfamily of the *Phycitidæ*.

In view of the introduction of *Tallula atrifascialis* I add an amended Synopsis of Genera.

SYNOPSIS OF GENERA OF N. A. EPIPASCHIINÆ.

1 Fore wings of ♂ simple, 12-veined in both sexes 2
Fore wings of ♂ with costal fold and vitreous spot beneath 7
2 Maxillary palpi present, hind tibiæ of ♂ with 2 pair of spurs 3
Maxillary palpi invisible, hind tibiæ of ♂ with end pair af spurs only .... **Oneida**
3 Antennal process more or less strong, maxillary palpi bilobed at end 4
Antennal process nearly obsolete, maxillary palpi not bilobed ..... **Tallula**
4 Hind tibiæ with 2 pairs of spurs 5
Hind tibiæ with end pair of spurs only ..... **Yuma**
5 Maxillary palpi scaled in ♂ ..... **Epipaschia**
Maxillary palpi pencil tufted in ♂ 6
6 Process long ..... **Cacozelia**
Process short ..... **Stericta**
7 Fore wings 11-veined in ♂, 12-veined in ♀ 8
Fore wings 11-veined in both sexes 9
8 Fore wings, 10 and 11 separate; 6 stemmed with 7, 8 and 9 in ♀ ... **Lanthaphe**
Fore wings, 10 and 11 stemmed, 6 separate ..... **Saluda**
9 Maxillary palpi present; antennal process more or less developed 10
Maxillary palpi invisible; process hardly indicated ..... **Attacapa**
10. Fore wings 6, 7, 8 and 9 stemmed in ♀ ..... **Tioga**
Fore wings 6 separate in ♀ ..... **Tetralopha**

CATALOGUE OF GENERA AND SPECIES.

EPIPASCHIINÆ, Wals.

Epipaschiæ, Grt.
Epipaschiidæ, Meyr.

I.—**EPIPASCHIA**, Clem.

Deuterolyta, Led.
Mochlocera, Grt.
Catamola, Meyr.
Astrapometis, Meyr.

1. **superatalis**, Clem.
   conspicualis, Led.
   borealis, Grt.
   olivalis, Hulst.

II.—**CACOZELIA**, Grt.

2. **basiochrealis**, Grt.

III.—**STERICTA**, Led.

Glossina, Guen.
Toripalpus, Grt.
Winona, Hulst.

3. **incrustalis**, Hulst.
4. **breviornatalis**, Grt.
5. **trabalis**, Grt.

IV.—**ONEIDA**, Hulst.

6. **lunulalis**, Hulst.

V.—**YUMA**, Hulst.

7. **adulatalis**, Hulst.

VI.—**TALLULA**, Hulst.

8. **atrifascialis**, Hulst.

VII.—**LANTHAPHE**, Clem.

9. **platanella**, Clem.

VIII.—**SALUDA**, Hulst.

10. **asperatella**, Clem.
11. **melanogrammos**, Zell.
    talleolalis, Hulst.
    var. **diluculella**, Grt.

IX.—**TIOGA**, Hulst.

12. **aplastella**, Hulst.

X.—**TETRALOPHA**, Zell.

Loma, Hulst.
Wanda, Hulst.
Katona, Hulst.

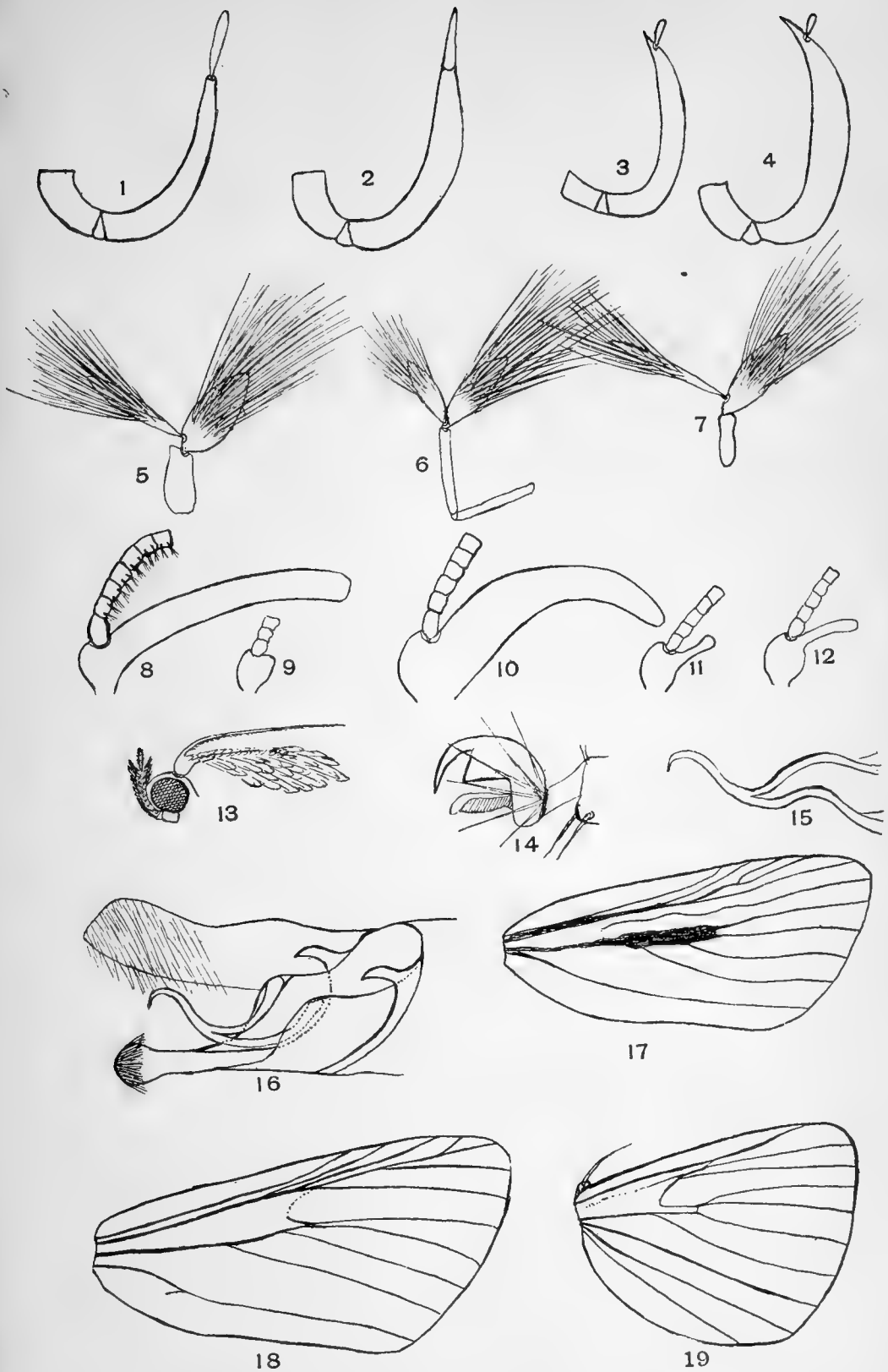
13. **nephelotella**, Hulst.
14. **robustella**, Zell.
15. **baptisiella**, Fern.
16. **militella**, Zell.
17. **tiltella**, Hulst.
18. **euphemella**, Hulst.

XI.—**ATTACAPA**, Hulst.

19. **callipeplella**, Hulst.

EXPLANATION OF PLATE.

Fig. 1. Palpus of Tetralopha robustella, ♂.
" 2. " " Lanthaphe platanella, ♀.
" 3. " " Tetralopha baptisiella, ♂.
" 4. " " Saluda asperatella, ♂.
" 5. Maxillary palpus of Saluda asperatella, ♂.
" 6. " " " Tetralopha baptisiella, ♂.
" 7. " " " Yuma adulatalis, ♂.
" 8. Antennal process of Epipaschia superatalis, ♂.
" 9. " " " Attacapa callipeplella, ♂.
" 10. " " " Cacozelia basiochrealis, ♂.
" 11. " " " Tetralopha baptisiella, ♂.
" 12. " " " Tioga aplastella, ♂.
" 13. Head of Epipaschia zelleri.
" 14. Claw of " "
" 15. Uncus of Saluda asperatella, ♂.
" 16. Genitalia of Cacozelia basiochrealis, ♂ (uncal parts protruded).
" 17. Venation fore wing of Tetralopha baptisiella, ♂.
" 18. " " " Epipaschia superatalis.
" 19. " hind wing " "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COLLECTING NOTES.

By H. F. Wickham.

The occurrence of a *Brachynus*, determined by Dr. Horn as *cinctipennis*, Chev., at Albuquerque, N. Mex., adds a very pretty and easily recognized species to our fauna. Three specimens were taken in July.

Clenistes pulvereus, Lec., occurs at Williams, Arizona, under Pine bark in October, and *Fustiger fuchsii* Br., was taken in the same locality, with a small black ant which makes its nests above ground in dried cow droppings. Six specimens were found early in May. The occurrence of this species so far West is of interest, and the ant with which it lives is a different species from any that I have seen in the East. Mr. Ulke writes me that he sees no difference in my specimens of *F. fuchsii* and his types from Tennessee.

Hetærius tristriatus, Horn, was taken at Coolidge, New Mexico, at an elevation of about 7,000 ft. My specimen was found in the evening resting on a stone under which was a colony of ants. This species was described from Calaveras, Cal.

At Needles, Cal., I had my first experience with *Gyascutus planicosta*. Here they were quite numerous, but so extremely active that it was with difficulty that I got four or five of them the first day. They are seen clinging to the twigs of a gummy bush, growing in sandy spots away from the river, and take flight at the slightest alarm. However, I succeeded in getting a nice lot of them by rising next morning before the sun, when I found them on the twigs, quite inactive and easily taken by hand without the use of a net. In this way I took more of them in one hour than I could have taken in ten, had I waited until day advanced.

Niptus ventriculus, Lec., is sometimes gregarious, as I found a colony of about 35 individuals, at Winslow, Arizona, May 5th, all close together under an old log. This species probably breeds in old wood, as there was nothing under the log but sand, and many others of this family are lignivorous.

One of the characteristic features of the insect fauna of the Southwest is the occurrence in large numbers of many fine *Otiorhynchidæ* and *Cleonini*. These occur both on plants, and around the roots in the sand.

Ophryastes vittatus is found chiefly on the "greasewood," high above ground on young shoots; while *O. sulcirostris* and *O. latirostris* occur around the roots of this and other plants, being it seems not so fond of climbing. The color of the two last mentioned species agrees better with that of the soil than does the color of *O. vittatus*, but is not so well adapted to the purpose of concealment, when high up among the leaves. A very pretty new species of this genus rewarded my search.

Two, or possibly three, species of *Eupagoderes* are also found in the same locality and situation, one of them, *Eu. sordidus*, preferring low plants.

Diamimus subsericeus was taken around the roots of cottonwoods, and *Peritaxia hispida*, rare, under pieces of bark or logs, the former at Winslow, the latter at Walnut, Arizona. *Eucyllus vagans* was found under ties at Barstow, Cal., *Pandeletejus cinereus* and *Cyphus lautus* at Peach Springs, Arizona, around the roots of scrubby brush.

Among the *Cleonini* were the following species—*Lixus pleuralis*; *Centrocleonus molitor* and *angularis*; *Cleonopsis pulvereus*; *Cleonus frontalis*, *virgatus*, and *quadrilineatus*—all of which, with the exception of the first two, occurred almost entirely on the ground, at the roots of low plants.

Species of *Dorytomus*, *Bagous*, *Tychius*, *Acalles*, *Zascelis* and others also frequent these situations: so it will be seen that it will pay collectors in the Southwest to give considerable attention to this mode of collecting,—which I found to yield better returns in *Rhynchophora*, and some other groups, than any other way I could devise.

List of the ORTHOPTERA found on Staten Island.

By Wm. T. Davis.

Staten Island offers in its few square miles natural features as diversified as they could well be in so small an area at this part of the coast. The expanse of salt meadow, the moderately high hills in the interior, many of which are still wooded, and the sand dunes and barren ground along the Kills and at Tottenville, are each inhabited by species of *Orthoptera* that very rarely or never leave them.

Anaxipha exigua seems to be confined to the salt meadows and only one specimen of *Conocephalus exiliscanorus* has been taken at a distance from the salt water creeks near which it makes his home. *Paroxya atlantica* is particularly numerous on these meadows and the species of *Xiphidium* and *Stenobothrus* are also found plentifully in the same situation. *Dissosteira collare* and *Psinidia marmorata* have only been found on the sand dunes and barren ground along the Kills, and *Melanoplus collinus* is also most plentiful in the same localities. *Chlœaltis conspersa* occupies the hills and particularly the edges of pastures and in waste places.

With the exception of *Periplaneta americana*, which has been reported inhabiting green houses, all the species have been captnred by me. The month when the first imago has been observed on the Island, is indicated, in nearly every case, after the specific name, from which time until frost they are usually to be met with.

The chief difficulty in the preparation of the list has not consisted in capturing the specimens, though, as already stated a few are rare and others local, but has centered more particularly about the disputed species. Mr. Samuel H. Scudder has identified many of the specimens and some have also been inspected by Mr. Lawrence Bruner.

Nearly all of the species mentioned will be found described at some length in "The Orthoptera of New England," by C. H. Fernald, published in the Thirty-fifth Annual Report of the Mass. Board of Agriculture. Seventy-one species are noted in that work and it will be observed that sixty-three are here recorded.

GRYLLIDÆ.

Gryllotalpa borealis, Burm. August.

This insect is not difficult to capture. It can be located in the muggy places that it inhabits by it song and may be easily probed out of the tunnel with the finger. If the captive specimen is placed on the ground it will begin straightway to dig, or if put on a handkerchief or piece of paper, go through all the motions necessary to bury itself under natural conditions.

Gryllotalpa columbia, Scudder. August.

This form does not differ from the preceding, except in length and size of wings ; a common variation in *Gryllus* and in insects of other orders. It is often attracted by light, at least, I have a specimen that was captured in a barber shop and another found in a parlor.

Gryllus abbreviatus, Serville.

" **luctuosus**, Serville.

Gryllus may be heard stridulating on the last days of May and from thence onward to frost. Many of the immature live under stones &c. over winter, and if they are placed in a box together they speedly fight, and the weaker ones are devoured.

Nemobius vittatus, Harris. Late June and July.

This insect is quite pugnacious and will sometimes bite savagely when poked with a straw, even coming forward to meet it, after several apparent failures on the part of the straw to do it any damage. They will also quarrel among themselves. I have seen two individuals fighting in the field, all the while keeping up a constant stridulation, but neither one appeared to be at all injured, they having merely pulled one another about a little. There is a small form that has generally been included in this species. What Dr. Fitch calls the "fiddle bow nerve" in the tegmina is differently shaped from the preceding, the ovipositor is shorter (4 to 5 mm. long), and the stridulation a continuous rolling whir, instead of the ordinary *creak, creak, creak.* However, further investigation may prove these characters unstable.

Anaxipha exigua, Say. August.

Staten Island appears to be the most north-eastern station for this insect so far reported. It is not uncommon in certain localities along the ditches in the salt meadows where the high tide bushes (*Iva frutescens*) grow. It clings from six inches to a foot up the stems and its song has a particular silvery tone.

Œcanthus niveus, Serville.
" **fasciatus**, Fitch.
" **angustipennis**, Fitch.
" **bipunctatus**, DeGeer.

These insects reach maturity in late June and in July. Concerning *angustipennis* and *fasciatus* there has been much question, but they are, I think, distinct from *niveus*. Their structure is not the same and their stridulation is different. That of *niveus* is a *beat, beat,* pulsating sound; that of *angustipennis*, a faint continuous whir lasting only about five seconds with an equal interval of rest, and that of *fasciatus*, a long and comparatively loud, continuous whir often lasting several minutes. In addition these insects are not often found inhabiting the same bushes and trees. Their nuptial attentions are amusing. I have seen the "slender *Œcanthus*" devour its pupa skin after ariving at the perfect state.

LOCUSTIDÆ.

Ceuthophilus maculatus, Harris. Sept.
Cyrtophyllus concavus, Harris. Late July and Aug.
Amblycorypha oblongifolia, DeGeer. Aug.
" **rotundifolia**, Scudder. August 2nd.
Microcentrum retinervis, Burm. Aug.
Scudderia curvicauda, DeGeer. Aug. 6th.
Conocephalus ensiger, Harris. July 9th.
" **exilicanorus**, Davis. Aug.

This insect is plentiful along the salt water creeks in certain localities on the Island and its stridulation as well as its form resembles that of *ensiger* more than any other native *Conocephalus*. We cannot count with any accuracy in *ensiger* the number of times one wing is drawn over the other as indicated by the rise and subsidence in the song, but *exilis-canorus* is such a slow singer that this estimate can be easily made, one wing being rubbed on the other about 115 times in a minute. The species devours the heads of the meadow grass (*Spartina*) and it was while thus employed that I first observed the female insect. When describing the species (Canadian Entomologist, Vol. XIX, p. 56), only the males were mentioned, but it is sufficient to add that the ovipositor is 37 mm. in length.

Conocephalus dissimilis, Serv. August.
" **robustus**, Scudder. August.
Xiphidium fasciatum, DeGeer. August.
" **brevipenne**, Scudder.
" **vulgare**, Harris. July 8th.
" **concinnum**, Burm. July.
Thyreonotus dorsalis, Burm.
" **pachymerus**, Burm.

ACRIDIDÆ.

Pezotettix scudderi, Uhler. Aug.
Acridium alutaceum, Harris. Aug.
" **rubiginosum**, Harris. Aug.
" **americanum**, Drury.

I observed a large grass-hopper at Tottenville on May 6th, 1888, which. I think, belonged to this species, but it is more often seen in November and will, at such times, fly up into the trees to escape capture.

Melanoplus femoratus, Burm. July.
" **punctulatus**, Uhler. Sept. 21st.
" **collinus**, Scudder. Aug.
" **femur-rubrum**, DeGeer. July.
" **atlanis**, Riley. Aug.
Paroxya atlantica, Scudder. July.
Chlœaltis viridis, Scudder. July.
" **conspersa**, Harris. July.
Stenobothrus curtipennis, Harris. July.
" **maculipennis**, Scudder. July.
Arphia sulphurea, Fabricius.

What is considered as the Spring form arrives at maturity about the middle of May and a few survive to the middle of July. As early as August 7th winged examples of the Fall form may be found in sandy places, and by the middle of September they are numerous.

Chortophaga viridifasciata, DeGeer.

Spring brood from late April to July ; late Summer brood from July to frost

Encoptolophus sordidus, Burm.
Hippiscus tuberculatus, P. de Beauvois. May. A few living until July.
Dissosteira carolina, Linn. June.
" **bollii**, Scudder. Sept.
" **collare**, Scudder. Aug. 7th.
Psinidia marmorata, Harris. Aug. 7th.
" **fenistralis**, Serville. Aug. 7th.
Trimerotropis maritima, Harris. July.
Tettix granulatus, Kirby. April to Sept. inclusive.
" **ornatus**, Say. April to Sept. inclusive.
Tettigidea lateralis, Say. April and May.
" **polymorpha**, Burm. April to Aug. inclusive.
Batrachidea cristata, Harris. April to Oct. inclusive.
" **carinata**, Scudder. April.

PHASMIDÆ.

Diapheromera femorata, Say. September.

BLATTIDÆ.

Ectobia germanica, Fabricius.
Periplaneta americana, Fabricius.
" **orientalis**, Linn.
Platamodes pennsylvanica, DeGeer. June.
" **unicolor**, Scudder. June.

FORFICULIDÆ.

Anisolabis maritima, Bou.

Notes on Water Beetles.

By C. H. Roberts.

The occasional finding of a single specimen of some so-called Western species in the East or South has been sometimes noted, and is easily accounted for. Like, for instance, the writer's taking a specimen of *Chrysobothris exesa* near the New York Central R. R. tracks in N. Y. City, which was undoubtedly conveyed there in a freight car or in lumber. But it is not usual to find such species in numbers nor continuously.

Bennington County, Vermont, has proved to me unique in this respect.

Three seasons ago I took a single specimen of *Cnemidotus callosus* there, and last season two specimens more were taken. I have also taken five specimens of *Deronectes striatellus*. Heretofore I have known these two only from the West and South-west.

I have also taken three examples of an undescribed species of *Hydroporus*, found previously, so far as I can learn, only at or near Washington, D. C.

Last, but not least remarkable, Dr. Horn has just determined for me, from the same locality, Manchester, Vt., *Limnebius piceus*, "known only from California!" Of this species I have taken twelve or fifteen specimens, and it can not therefore be *chance*, but is certainly remarkable distribution.

This locality has proved an Eldorado, as far as water beetles, in a broad sense, are concerned. I am a very busy man, unfortunately for my collection, and a short vacation during the Summer is about all the time I have to devote to collecting; yet in three seasons I have turned up *ninety-seven* species. My son, a mere lad, but an enthusiastic collector, captured during last season forty odd species, among them upwards of 250 specimens of *Cnemidotus edentulus*, so that I am rather "long" of that stock. *Parnidæ* are usually looked for upon sticks, bits of wood or bark, and under stones, &c., in *swift running streams*, but it has not been my experience to find them there exclusively. There is quite a body of water at Manchester, called Dead Pond, which apparently has neither inlet nor outlet, and is as still and *dead* as a pond can be. Here I find, each season, two or three species of *Elmis*, clinging to the stems of moss.

The moss also yields many of the smaller *Dytiscidæ*, &c. I have found a net made from common, though stout, cheese cloth best, as it drains easily and none of the small things escape. I have taken in a single haul, from a ditch not over eight inches deep, and barely wide enough to admit a net, literally hundreds of specimens; and they were

not all *Bidessus affinis* and *Hydroporus undulatus* either. The ditch drains a spring-hole in a meadow. I have lately taken a great liking to this interesting group of Coleoptera, and the scarcity of good collections, or even of good series of the commoner species, amongst my friends has led me to write and show what can be done, even with little time at your disposal, by careful and persistent collecting.

S. LOWELL ELLIOT, Ph. D.

American Entomological Science has met with a great loss in the death of Mr. Samuel Lowell Elliot, who died, February 12, 1889, aged 45, at his home in Brooklyn, from nervous prostration after a brief illness. Of delicate constitution, having been an invalid the latter part of his life, he devoted for many years past, when health permitted, all his time to the collection and rearing of Lepidoptera, in which he met with wonderful success. Inheriting unusual inventive talent, and possessing keen perceptive faculties, he collected great numbers of the rarer caterpillars, carrying them through their different stages with great success. With rare ingenuity he devised breeding cages and showed great skill and tact in caring for the larvæ and in contriving boxes for hibernating both larvæ and pupæ. He was especially successful in his apparatus for receiving the insects as they emerged from the chrysalis, so that their wings always developed well. Thus he would rear hundreds and thousands of *Bombycidæ*; his devices for mating them and securing the eggs of many rarer species showing great patience and sagacity. The result was that he bred the most perfect specimens of our rarer species of Butterflies, *Sphingidæ* and *Bombycidæ* by the thousand. Of the *Cochlidæ*, for example, he had raised twenty species, comprising large suites of specimens forming entire broods. There is probably no such collection in this country of such suites of perfectly preserved specimens. The moment the moths issued from their cocoons, when their wings were fully expanded he would watch for them, and before they had flapped their wings so as to disturb the scales, would poison them, and transfer them to the setting-board.

Had his life been spared, and had he had more strength, he would have amassed a collection unique in showing the variation of species. Unfortunately Mr. Elliot did not take notes or make full descriptions of the early stages, but the writer can testify as to his generosity in allowing others to use for study his rich material, and to his hospitality. Mr. Elliot was a born collector rather than a student; he had wonderful keenness of vision and perseverance in detecting larvæ; he was also a collector of books, of which within a period of five years he had amassed a collection of Americana including Natural History, and Agricultural Reports, forming a collection of 10,000 volumes. His house, from cellar to attic, was filled with books. One spare room was filled with rearing apparatus, on which he spent thousands of dollars. Had he been permitted to live, the results to the higher study of Lepidoptera would have been marked.

Mr. Elliot was modest, retiring, unselfish, freely opened his treasures in Entomology and the rarities of his library, to those whom he thought would appreciate them. He leaves a widow who keenly sympathized with him in his pursuits and possesses the same sharp eye for rare insects, and his fondness for Natural Science.

A. S. Packard.

At a regular monthly meeting of the Brooklyn Entomological Society, held on March 5th, 1880, the death of Mr. Elliot, an active member of the Society, on February 12th, in the City of Brooklyn, was announced and Messrs. Pearsall and Weeks were appointed a Committee to prepare the following brief memorial concerning him for insertion in the Society Publication and upon the minutes.

Mr. Elliot was born at Plattsburg, N. Y., and was the only son of Dr. William H. Elliot, the inventor, from whom he inherited much of his readiness of resource and enthusiasm in the prosecution of his chosen pursuits. Though for many years almost an invalid and at times a great sufferer from pulmonary affection, his extraordinary will-power seemed to rise superior to his physical weaknesses and urge him to exertions from which those of more robust constitutions might well shrink; nor did he ever permit considerations of health or personal convenience to interfere with his self-allotted tasks, however arduous.

He was an ardent entomologist and especially interested himself in breeding and rearing local Lepidoptera, which he did upon an extensive scale and with distinguished success and in addition devised many novel and excellent methods of developing and preserving insects in every stage. It is to be regretted that his excellent practical knowledge of the habits and food plants of Lepidoptera together with the results of his experiments were not reduced to writing by him and published for the benefit of Science.

His abounding enthusiasm and energy have not been without their effect however, and have done much toward establishing a standard of careful manipulation and perfection of specimens and particularly the principle of tracing varieties by rearing from a parent stock—an example which cannot be too highly commended to our fabricators of nomenclature.

For several years past his efforts have also been directed toward the formation of a scientific library, which at the time of his death already consisted of some 10,000 volumes, many of them very rare and of much value.

He was an active member of many of our leading scientific societies, and shortly before his death had conferred upon him the degree of Doctor of Philosophy by the Faculty of Union College in recognition of his eminent and unwearying zeal in scientific work.

The members of this Society desire to express their sincere regret at the premature termination of a life so earnest in its aims and so conscientiously devoted to the advancement of Science.

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Phragmatobia assimilans, *Walker.*

By Annie Trumbull Slosson.

Mr. Henry Edwards, in his preface to the supplement to "New Check List" (Ento. Amer., March, 1888), in speaking of Walker's types in the British Museum, says: "It is probable that a few of the species mentioned may yet await re discovery by our entomologists, and that they are fully entitled to a position in our lists."

I feel confident that I have reclaimed, from the doubt and suspicion long surrounding it, one of these species, and can prove its right to the place in our lists given it by Mr. Edwards.

Last May I took at light in Franconia, N. H., on a cool evening towards the last of the month, a *Bombyx* which puzzled me greatly. It was much like *Phragmatobia rubricosa*, Harris, but a good deal larger, and differing in other respects. Still I thought, at first, that it might be a large female of an early brood.

On my return to New York in the Autumn I showed the insect to several entomologists, but it was new to all. One day, during the winter, in glancing over Mr. Edwards' supplement I saw the name of *P. assimilans*, Walk., and began to wonder if my moth might not be this long sought species. The supplement refers to "Cat. B. Mus., *pl. 3*, p. 630." I wrote to Mr. Edwards in regard to this and was told that the reference to "plate" was an error and should be "*part 3*." I could find but little literature on the subject. In Morris's Synopsis is given this extract from Cat. B. Mus.

"**P. assimilans,** Walk. *Male.*—Red. Antennæ, testaceous. Thorax with brown hairs. Wings red, veins darker. Primaries slightly brown along the costa, and elsewhere indistinctly sprinkled with pale

brown, with two blackish dots. Secondaries brighter red, with three black dots, two in disk, and one near hind border towards inner angle. Length of body 6 lines, of wings 16 lines. *Var.*—Primaries almost wholly brown. Secondaries with broad blackish submarginal stripe. United States."

Now my moth answers in every detail to first description, except that it is a female and larger, being more than 18 lines in extent. The dots are obscure, but their traces may be seen. In "Notes of N. Am. Lepidoptera in B. Mus. and described by Walker," Grote and Robinson (Trans. Am. Ento. Soc., Vol. II, p. 72) I find the following allusion to the moth in question.

"*P. assimilans.* The two specimens (a. b.) differ from *rubricosa* and *fuliginosa*, by their greater expanse and differently shaped primaries. These are more produced at apices, below which the extreme margin is sinuate, not rounded. We have seen no specimens of this species in any collection in United States."

Mr. Hy. Edwards, in a brief note made on a visit to British Museum in 1888, says of the types: "Looks like a large specimen of *rubricosa*, but one example has no spots."

I have shown my moth to Mr. Edwards, who agrees with me, that it is Walker's species, but thinks it should be placed in a different genus from *rubricosa*, perhaps *Antarctia*. This I am not competent to decide, and shall leave to wiser heads.

We noticed recently in some German periodical, a method of relaxing Lepidoptera that might merit trial. The writer used a shallow vessel with a tight fitting lid, covered the bottom with alcohol sufficient to float the cork containing his specimens and left them for a time. It is asserted that they relax rapidly and very completely, that the colors of even the most delicate species is absolutely unaffected —that specimens never become wet, dirty, or mouldy, and that while the relaxation is very complete the setting takes place very quickly and firmly, and the specimens can be removed, much sooner than if relaxed by moisture derived from water. The current methods leave something to be desired, and perhaps this will fill the "long felt want."

* * *

By the time this number reaches our readers, *Lachnosterna* will be on the wing. Will not all Coleopterists collect them largely this season, and send us lists of their captures? If there be a question of identification, we shall be glad to attend to that.

Descriptions of New Species of Mexican HETEROCERA.

By Wm. Schaus, Jr.

The following species were all captured by myself in the State of Vera Cruz, Mexico, and the types are in my own collection.

Family AGARISTIDÆ.

Pseudalypia stuartii, n. sp. Primaries brown-black; a streak of metallic blue scales between the median and submedian veins, and a small spot of the same at the end of the cell, beyond which a narrow white band crosses the wing from close to the costal margin to near the internal angle; at each extremity this branch turns abruptly inwards, forming a sharp hook; fringe brown. Secondaries blue-black; fringe brown. Underneath brown-black with the transverse band on the primaries repeated as above. Head and thorax brown. Tegulæ orange. Body blue-black. Legs brown.

Expanse, 38 mm. 1 ♂. Paso de San Juan.

This species is very closely allied to *Pseudalypia walkeri*, recently described by Mr. Druce, and found at Acapulco.

Subfamily EUDRIINÆ.

Leisoma juanita, n. sp. Primaries above brown, powdered with bluish atoms especially along outer margin. An elongated, irregular, olive-green space extends from base of wings and nearly touches the costal margin at a third from apex; this space is separated from the ground color towards the inner and outer margins by a band of very dark brown, at the end of the cell is a small bluish crescent. Apex broadly white bordered internally by a broken band of dark brown; a series of small brown spots along the outer margin; fringe white at apex, brown otherwise. Secondaries above brown-black with fringe white, except on inner margin where it is brown. Underside of wings brown-black without markings; the apex of primaries white, and the outer margin thickly powdered with white scales. Head and thorax brown with bluish atoms. Ocellus white. Antennæ brown, white at the base. Body brown-black with a large orange spot on either side. Legs brown, powdered with bluish scales.

Expanse, 46 mm. 1 ♀. Paso de San Juan.

Found in thick forest.

Family ZYGÆNIDÆ.

Subfamily PHÆUDINÆ.

Harrisina mexicana, n. sp. Very similar to *americana* of Harris, but much smaller than any specimens I possess of that species. Entirely dull black with the secondaries semi-transparent. The antennæ are also much more deeply pectinated than in the above mentioned species.

Expanse, 18 mm. 1 ♂. Paso de San Juan.

This species is also allied to *Harrisina guatemalena* of Druce.

Lycomorpha teos, n. sp. Primaries above light brown, yellowish along the costal margin for two-thirds; a very narrow black margin from middle of costa to the apex where it becomes slightly wider and continues so to the internal angle, where again it becomes very narrow along the internal margin. Secondaries dull orange with a narrow black margin. Underneath entirely dull orange with black margins as above. Antennæ, head, thorax and body black; collar orange.

Expanse, 22 mm. 1 ♂. Barranca of Simalohuacan, State of Vera Cruz. Elevation, 7,000 feet.

Lycomorpha regia, n. sp. Primaries bright orange, along costa a very narrow black margin which becomes wider towards the apex, and continues wide to internal angle. At the apex the black margin is bordered inwardly with pale yellow. Fringe very conspicuous, white. Secondaries the same color as primaries, very broadly bordered with black at the apex, and diminishing rapidly to middle of external margin where it ceases; the fringe bordering this portion is white, but on the rest of the outer margin and also along the internal margin the fringe is orange. Underneath the wings are orange, broadly black at apices. Head white with a black spot on frons. Thorax and body above orange, underneath white. Antennæ black. Legs black on their upper side, white underneath.

Expanse, 28 mm. 1 ♀. Jalapa.

A marvellously pretty species.

Subfamily **EUCHROMIINÆ.**

Macrocneme cinyras, n. sp. Primaries for two-thirds from base metallic blue-green, except a narrow black space extending from the internal margin close to the base of wings, towards the apices; primaries otherwise dull black with two white spots at the base of wings. Secondaries dull black with a few metallic green scales clustered near the center of outer margin. Wings underneath brown-black, metallic green on costal margins for half their length. Antennæ black tipped with white. Head black. Thorax green-black. Abdomen dull golden green with two white spots underneath. Legs brown-black. Tibia and tarsus thickly clothed with long black scales.

Expanse, 33 mm. 1 ♂. Coatepec.

Callicarus laciades, n. sp. The primaries and secondaries uniform dull black, a few minute metallic spots at the base of the primaries. Antennæ black, tipped with white. Head black; frons metallic blue. Collar and thorax black, spotted with blue. Abdomen black with a dorsal and a lateral row of metallic spots. In the male there are a few orange scales on anus. Legs black; tarsus tipped with orange.

Expanse, 30 mm. 1 ♂, 3 ♀♀. Paso de San Juan and Coatepec.

This species is very closely allied to *Callicarus laconia*, Druce, and also to the following species.

Callicarus misitra, n. sp. Very similar to *Callicarus laciades*, and only differs in having the wings slightly transparent, and behind the head are two small but conspicuous orange spots.

Expanse, 30 mm. 1 ♂. Paso de San Juan.

Callicarus jalapensis, n. sp. Head, thorax, abdomen, legs and wings dark brown, the primaries darkest at the base and becoming paler towards the apex. At the base of primaries is a small violet spot. Tarsus pale yellow.

Expanse, 40 mm. 1 ♀. Jalapa.

Cosmosoma aleus, n. sp. Male.—Primaries hyaline white ; the veins, outer borders, apices, and a large space extending from the internal angle to the discal cell, and also a spot at the end of the cell, brown-black. The costal and internal areas to near apex and internal angle, also the base of wings dull orange. Secondaries white, hyaline, orange at base ; the costal margin narrowly brown-black, the outer margin very broadly so. Underneath the markings are repeated as on upper side ; costal margin of primaries narrowly yellow ; on costal margin of secondaries a broad yellow space, and also yellow at the base. Antennæ black, tipped with white. Head and thorax black, spotted with blue ; two orange spots on collar ; tegulæ streaked with dull orange. Abdomen black with two dorsal and a lateral row of metallic blue spots. The female differs in having only a small dark space at the internal angle of the primaries, so that the space between the third and fourth nervules of the median vein is hyaline and not opaque as in the male. The border on the outer margin of the secondaries is also much narrower than in the male.

Expanse, 26 to 31 mm. Paso de San Juan.

This species is very abundant amongst low shrubs on the outskirts of the forest, and was found in large numbers flying with *C. auge, C. cingulatum* and *C. impar.*

Dycladia pyrrha, n. sp. Wings hyaline white with a narrow black border, which is widest at the apices of the primaries. On the costal margin at the base of primaries there are a few orange scales. Underneath the same as above ; yellowish at the base of the wings. Antennæ black with a white circle near their tips. Head, abdomen and legs dull black. Thorax and tegulæ bright orange.

Expanse, 19 mm. 1 ♂. Paso de San Juan.

Family **ARCTIIDÆ.**

Subfamily **CHARIDEINÆ.**

Aclytia lucania, n. sp. Primaries dull brown. Secondaries whitish hyaline with the apices and outer margins black, especially broad at the anal angle. Underneath the same as above. Antennæ, head and thorax dull brown ; two small yellow spots at the base of the tegulæ. Abdomen dorsally and laterally with three rows of metallic blue spots. Underneath abomen yellow.

Expanse, 36 mm. 1 ♀. Coatepec.

Aclytia superba, n. sp. Primaries glossy black, with a darker velvety blotch near the apex, and two indistinct bands of the same character extending from the cell to the inner margin. Secondaries semitransparent white with a black spot at the end of the cell, and a very broad black border to the apices and outer margins. Antennæ, head and thorax black. Abdomen above with the entire first segment, and the dorsal portion of the second segment black ; otherwise bright red with narrow black transverse bands between each segment. Abdomen underneath black. Legs black ; fore femora bright red.

Expanse, 47 mm. 1 ♀. Coatepec.

Heluira ælia, n. sp. Primaries dull brown and apparently slightly transparent so that all the veins and nervules are distinctly marked in a darker shade of brown. Base of wings, a spot at the end of the cell, the apices, the outer margins and a blotch at the internal angle also of a darker shade. Secondaries whitish towards the base, otherwise brown-black ; a tuft of white hairs in anal fold. Wings underneath dull black with all the veins and nervules distinctly showing. Antennæ black. Head brown with two bright red spots behind the antennæ. Thorax brown, underneath a crimson spot. Abdomen dorsally metallic blue, with narrow black transverse bands between the segments, and a tuft of long brown hairs dorsally on first three segments. On abdomen underneath a large white spot.

Expanse, 30 mm. 1 ♂. Paso de San Juan.

Automolis nabdalsa, n. sp. Primaries with a broad, central, longitudinal band chrome yellow, otherwise light brown with all the veins and nervules yellowish. Secondaries with a wide dark brown marginal band extending from apex to anal angle, where it is broadest. Underside similar to upper. Antennæ brown. Head yellow with a small metallic spot on the frons. Thorax yellow. Abdomen above yellow, last three segments black, spotted with metallic blue. Abdomen underneath yellow. Legs yellow, brownish at base. Fore femora metallic blue.

Expanse, 40 mm. 1 ♀. Paso de San Juan.

Bears a certain resemblance to *Eucyrta prætexta* of Felder.

Automolis orbona, n. sp. Wings entirely bright yellow, the apices of primaries faintly tipped with brown, and an indistinct small brown spot on outer margin below apex. Secondaries with the outer margin narrowly and faintly bordered with brown. Underside similar to upper, but with the costal margin of primaries slightly darker. Antennæ brown. Head brown ; a metallic spot on frons. Thorax yellow above ; underneath brown with metallic blue spots. Abdomen yellow, the last three segments black, spotted with blue ; laterally a row of blue spots.

Expanse, 30 mm. 2 ♂♂. Paso de San Juan.

Automolis parma, n. sp. Primaries orange, a small transverse white spot at apex, narrowly bordered with a dull brown band, which on inner side however does not quite reach the costal margin ; outer margin bordered by a very narrow brown line ; fringes ochreous. Secondaries pale ochreous, anal angle and a tapering border on outer margin brown-black. Underside the same as upper, but the border on secondaries is much narrower. Head, thorax and first segments of abdomen above bright orange, the remainder of abdomen black with a dorsal and a lateral row of metallic blue spots. Body underneath orange, the abdomen banded with black. Legs yellowish with longitudinal black lines.

Expanse, 31 mm. 1 ♂. Paso de San Juan.

This species is very similar to *A. contraria* of Walker, and differs chiefly in the narrower outer margin of the primaries and in the position of the white apical spot.

Preparatory Stages of Janassa lignicolor, *Walker*.

By Harrison G. Dyar.

Egg.—Globular and smooth. (The eggs were hatched when found, only the shell remaining.)

First larval stage.—Pale brownish yellow. The head, the hump on joint 5, and a dorsal line on the anterior segments, of a more distinctly brownish shade. Anal feet partly aborted.

Second larval stage.—Head slightly notched on top; yellowish, marked with two brown bands. Body yellowish. Humps on joints 5 and 12 brownish, as is also the semi-obsolete dorsal line.

Third larval stage—The markings of the mature larva now begin to be assumed. Head brownish, with four confluent round whitish spots in front, the mouth parts and mottlings on each side of the band also white. The body is pale brownish with three large dark green patches, two on each side of joints 3 and 4, as in *Cœlodasys unicornis*, and the third, a dorsal patch, on joints 11 and 12. Black shades on the sides of joints 6 and 7, and on the dorsum on 8, 9 and 10. A white spot at the spiracles on joint 11.

Fourth larval stage.—The dorsal green patch extends on joints 9 and 10, inclosing an oblong brown space. Black shades laterally on joints 5, 6 and 7, and dorsally on 8. Several white spots at the spiracles of joint 11.

Fifth larval stage.—Mature larva. Head, elliptical, with a depression at the summit, smooth. A hump on joint 5, prolonged upward and backward and terminating in two points, tipped with white. A pointed elevation on joint 12. Anal feet partly aborted, as in allied genera. Head whitish, with two mottled yellowish and brown bands, dentate inwardly, dividing the ground color in front into white spots; two near the vertex, two rounded near the center, and the mouth parts and the space immediately above them, white. Similar markings occur on the sides of the head, the ground color being divided into about six partly confluent white spots by brownish mottlings. Body, pale whitish, mottled with brown, much more heavily dorsally. A large dark green patch on each side of the anterior segments, bordered with brown, this border continued backward ventrally on joints 5 and 6, to joint 7. On the dorsum is another large dark green patch, beginning on joint 8 in two points, inclosing a patch of the ground color on joint 10, extending down on the sides at this segment, and ending abruptly at the end of joint 12. It is bordered with brown on joints 8, 9 and 10. The hump on joint 5 is shaded with dark brown, and there is a black patch on each side of joint 7; but this last marking is, in some cases, more or less obsolete. The spiracles on joint 11 are surrounded by a circular row of white spots, while the spiracles on joint 12 are black. Abdominal feet, whitish, with a brown line above the claspers, the line on joint 10 darkest.

Cocoon.—Tough and parchment-like, semi-transparent, similar to that of *Cœlodasys unicornis*. After forming its cocoon the larva fades to a nearly uniform whitish color, and the change to pupa does not occur till about a month before the emergency of the imago in the Spring.

Pupa.—Shining, light reddish brown, appearing somewhat darker between the segments; minutely, but sparsely punctured. At the posterior edge of the thorax

is a row of granular, square elevations, extending across in a curved line between the wing cases. Last segment furnished with two small divergent points.

Food plant.—White Oak (*Quercus alba*). During the first two larval stages the insects eat only the upper portion of the leaf, and their yellowish brown color well simulates its withered appearance. Subsequently they devour the entire leaf with the exception of the largest veins, and rest on its edge, where they might be mistaken for a curled and discolored portion.

Five eggs were deposited together in the present instance; but the larvæ feed singly.

I have seen no description of the female moth. It differs from the male as follows: It is larger, the antennæ are not pectinated, and the external margin of the primaries is slightly excavated between the veins for its lower half. In coloration it much resembles the male; but the "ochreous tinge" of the primaries below the median vein spoken of by Dr. Packard (Proc. Ent. Soc. Phil., Vol. III, p. 367) is not to be seen. The secondaries are tinged with cinereous for their outer third.

Larvæ from Dutchess County, New York.

PROF. C. V. RILEY is in Europe, representing the U. S. Dep't of Agriculture at the Paris Exposition.

* * *

PROF. C. H. FERNALD goes to Europe this Summer, and will study all accessible types of *Pyralidæ*. It is not a particularly creditable fact to America that her entomologists must travel to a foreign country to study American types—not ancient alone, but quite recent. The time ought really be now at hand when American entomologists should have a monopoly of describing American species, and should be able to find room for their types in this country. I am a believer in "Protection to Home Industries," and I believe there is plenty of room in our museums to hold all the types to be deposited there for some years to come.

* * *

SUPPOSE each collector during the coming season notes down some of the observations made by him concerning the habits of the insects he collects, and gives them to his fellow collectors through the medium of ENTOMOLOGICA AMERICANA! It would help all hands, including the editor, for then there would be no dearth of the most valuable kind of manuscript.

SOME NEW SPECIES OF LACHNOSTERNA.

By John B. Smith.

For more than a year I have been, during odd moments, studying the species of *Lachnosterna*, more especially with the aim of bringing out prominently the remarkable sexual characters of the species—characters which shed so strong a light on specific relationships that their study can not be much longer neglected. Not the male only, but the female as well, show excellent and sharply defined characters which place species upon a much more solid foundation than heretofore possible by a study of external structure merely—structures which are all more or less variable, and which allow too much latitude to individual opinion. The sexual characters within my experience are absolutely invariable—there is no "more" or "less," but they are practically identical, and equally constant in both sexes. Where any difference appears, it is indicative of a distinct species, though on the other hand I am not prepared to say that identity of sexual structure in all cases indicates identity of species. It would do so in *Lachnosterna*, in my opinion. These studies on the sexual characters of *Lachnosterna* are now completed, and I have figured 87 of the species in 265 figures The paper is ready for the printer, and will appear in due course in the Proceedings of the United States Nat'l Museum. As there is usually considerable delay in the printing of these Proceedings, I prefer to describe the new species now, to call attention to them during the present season. In "Insect Life," No. 6, I have already described four species, usually combined under the term *fusca*, another of these forms has come into my hands, equally deserving specific recognition.

L. insperata, sp. nov.

Agrees very completely with Dr. Horn's description of *fusca*, and superficially no obvious differences are apparent. The ventral characters of the male resemble those of *dubia* and *arcuata*, the ridge being strongly arched and small, but situated back from the posterior margin of the penultimate segment and not overhanging the last. In the female I have found no distinctive characters. Six specimens, taken under stones early in Spring by Mr. M. L. Linell, at Snake Hill, N. J., are before me—4 of them males, 2 females. The specimens are dark in color, and large and stout, resembling most nearly the larger form of *fusca*, which occurs with it. The male is readily recognizable, and I picked out the species immediately from a mixture of other specimens. The sexual structures bear out perfectly the position assigned, which is between *arcuata* Smith, and *dubia* Smith.

L. ulkei, sp. nov.

Form robust, ovate, rufocastaneous, shining. Clypeus slightly emarginate, the border moderately reflexed, surface rather closely punctate. Thorax widest at base, arcuatedly narrowed to the apex, margin indistinctly crenulated, with short ciliæ, surface distinctly but very irregularly and not very closely punctured, with a smooth median line. Elytra more deeply and densely, somewhat confluently punctured, the costæ evident. Pygidium rather finely and sparsely punctate. Metasternum densely punctured, the hair long and dense. Abdomen shining, sparsely punctate. Claws curved, the tooth median, stronger in the female. Last joint of the maxillary palpi ovate, not impressed. Length .85 inch = 21—22 mm.

Habitat—So. Car. (Ulke), Georgia (Ulke), Tenn. (U. S. N. Mus.), E. Florida (Ashmead). 3 ♂♂, 1 ♀.

Male.—Antennal club as long as the stem. Abdomen flattened at middle, penultimate segment with a perfectly straight, feebly elevated ridge, behind which the segment is strongly depressed, making the declivity deep and abrupt without any great elevation of the surface of the ridge. The ridge is close to the margin of the segment, and in the Tennessee specimen almost coincident with it. Last ventral feebly concave. Inner spur of the hind tibia two-thirds the length of the outer and stouter.

Female.—Antennal club small, much shorter than the funiculus. Last ventral segment feebly emarginate at apex. Pygidium more elongate than in the male, more shining, the punctures more deeply impressed.

This species agrees in all essentials and group characters with *fusca*, and with that species it has been confounded. The four specimens before me are very uniform in appearance, and chiefly differ habitally, in the paler color and the much more rugose appearance, the punctuation being coarser throughout. The lateral margin ef the thorax is also very feebly crenulated, yet not so as to throw the species into another group. The ventral character of the male gives an obvious and safe distinguishing feature for that sex. In the female the somewhat broader, more oval form and the coarser punctuation must suffice if the genitalia be not examined.

L. quadrata, sp. nov.

Form oblong, parallel, rather deep brown, shining. Clypeus very feebly emarginate, moderately reflexed, surface coarsely and rather sparsely punctured, front more closely and more deeply punctured. Thorax widest at base, arcuately but not very greatly narrowed to the apex, margin entire, with short ciliæ, surface rather sparsely and irregularly punctate, without an obvious smooth median line. Elytra closely and confluently punctured, the punctures tending to form longitudinal series, costæ obvious but not much elevated. Pygidium sparsely and finely punctate, the last two segments more coarsely. Claws curved, the tooth strong and median. Last joint of maxillary palpi ovate, not impressed. Length .87 inch = 22 mm.

Habitat—Enterprise, Florida. May.

MALE.—Unknown.

FEMALE.—Antennal club small, much shorter than the funiculus. Last ventral segment broadly emarginate at apex.

This species is based upon a single specimen taken by Mr. Schwarz, and now in his collection. It is evidently related to *fusca*, and agrees with it in all structural details. It is however well distinguished by the almost square clypeus, the punctuation of the head and elytra, and by the curiously parallel form. The genitalia are strongly characteristic and distinct.

L. nova, sp. nov.

Oblong, slightly broader behind, chestnut brown, shining. Clypeus moderately emarginate, the border narrowly reflexed, surface densely and coarsely punctured, the front less densely so. Thorax gradually narrowed from base to apex, sides feebly arcuate, the margin distinctly crenate, surface with distinct irregular punctures, sparse on the disc, where there are irregular smooth spaces, more densely and equally placed at the sides. Elytral punctures finer than those of the thorax, much more closely placed, somewhat rugulose, the costæ feeble but evident. Pygidium sparsely, finely and indistinctly punctate. Metasternum densely punctured, the hair not long nor dense, shorter in the female. Abdomen sparsely punctate at the sides, the last two segments more coarsely. Claws curved, the tooth strong and median. Last joint of maxillary palpi fusiform, not impressed. Length, .55—.70 inch = 14—18 mm.

Habitat—N. Y., Dist. Col., N. C.

MALE.—Antennal club equal to or slightly longer than the funiculus. Abdomen slightly flattened at middle, penultimate segment with a distinct, arcuate, granulated ridge, behind which the segment is deeply impressed and punctured. Last segment with a cupuliform depression. Inner spur of hind tibia shorter.

FEMALE.—Antennal club shorter than the funiculus. Penultimate segment with a linear impression close to and parallel with the hind margin. Hind tarsi slightly shorter than the male.

This species is not uncommon at Washington, and has been very generally confounded with *fraterna* and *forsteri*, with which it agrees in all group characters. Apart from the primary differences in the male genitalia, this sex is always easily recognizable by the distinct arcuate ridge of the penultimate and cupuliform depression of the last segment. The same character is sometimes approached in the *var. forsteri* but is never so distinct. The thoracic margin in both sexes is more distinctly crenate, though this too is indicated in some specimens of *fraterna*.

L. hornii, sp. nov.

Oblong oval, not broader behind, convex, very deep-brown or piceous, shining. Clypeus moderately deeply emarginate, rather more acutely in the female, margin narrowly reflexed, rather coarsely densely punctured, front scarcely less densely

punctured. Thorax distinctly narrower in front, sides very obtusely angulate, widest behind the middle, narrowed to base, more obliquely narrowed in front, margin feebly crenate, sparsely ciliate, disc convex, the punctures moderately coarse, variably placed, sometimes closely and equally, sometimes sparsely and irregularly on the disc, leaving smooth spaces, but no smooth median line; a distinct depression of the basal margin externally. Elytral punctures finer, much more dense, somewhat rugulose, costæ evident. Pygidium moderately and somewhat irregularly punctured, less densely so in the female. Metasternum densely punctured, the hair long and dense in the male, short and sparse in the female. Abdomen finely punctate, more dense at the sides, the last two segments much more coarsely and densely punctate. Last joint of maxillary palpi fusiform, not impressed. Length .75—.85 inch = 19 to 21 mm.

Habitat—Washington, D. C., Tennessee, Virginia, Ohio.

Male.—Antennal club slightly longer than the funiculus. Penultimate segment with a very strongly elevated, overhanging arcuated crest, occupying nearly the entire length of the segment, behind which there is a deep, transverse, punctured impression. In some specimens the crest is divided at the middle, and a longitudinal impression extends forward to the middle of the preceding segment. Last ventral with a quadrate, punctured impression, the hind margin with a small deep emargination. Claws arcuate, tooth rather extra median, shorter than in the female. The fixed spur is quite short, less than half the length of the outer, and proportionately less stout.

Female.—Antennal club shorter than the funiculus. Pygidium more elongate, the punctures smaller and more sparse. Posterior femora stouter, spurs of hind tibiæ short and stout. Penultimate ventral segment with a strongly impressed line near the hind margin, behind which the segment is depressed. Last ventral segment sinuate at apex, scarcely emarginate. Tarsi not shorter than in the male.

Variations.—In a series of nine specimens no variations are observed. The species is remarkably constant in form and color.

About a dozen specimens of this interesting form were taken at Washington during the season of 1888. None of the local collectors had ever taken it before, and it was but sparingly taken among the hundreds of other specimens. Mr. Schwarz received a single male specimen from the mountains of Tennessee, Mr. Alwood saw a specimen in a local collection in Virginia, and I saw several specimens in Mr. Dury's collection at Cincinnati, Ohio. The species is therefore probably widely distributed, though rare.

In group characters it would seem at first referable to the *fraterna* section of the group, but the large size, very long tarsi, and the marked sexual characters refer it rather with *rugosa* and allies, though the thorax is not evidently angulated, and the punctures not nearly so coarse. In

the short spur of the male it resembles *infidelis* while the distinct elytral costæ, as well as the ventral characters of the male, make it abundantly distinct.

I take pleasure in dedicating this strongly marked species to my good friend and mentor, Dr. Horn.

L. biimpressa, sp. nov.

Oblong, scarcely ovate, pale reddish-brown, shining. Clypeus moderately deeply emarginate, margin narrowly reflexed, densely and rather coarsely punctured, as is also the front. Thorax distinctly narrower in front, sides obtusely angulate, widest at middle, narrowed to base, more obliquely narrowed in front, margin irregular, scarcely crenate, sparsely ciliate, disc convex, the punctures coarse and rather closely placed, a distinct smooth median line, a distinct impression of the basal margin externally, and a distinct foveate impression at each side, nearly opposite the angle. Elytral punctuation finer, more dense, somewhat rugulose ; sutural costa distinct, the others feeble. Metasternum closely punctate, with moderately long hair. Pygidium rather sparsely, finely and irregularly punctured. Claws arcuate, with a strong median tooth. Last joint of maxillary palpi fusiform, not impressed. Length, .76 inch = 18 mm.

Habitat—Manhattan, Kansas.

Male.—Antennal club nearly as long as the stem. Abdomen flattened at middle, sparsely finely punctate at the sides, the last two segments more coarsely. Penultimate ventral segment with a rather feebly elevated, strongly arcuated ridge, behind which the segment is deeply impressed and punctured; the last segment with a somewhat quadrate depression.

Only a single male specimen is known to me. I have placed it in the *rugosa* group, and associated it with *scitula*, though the specimen has very evidently but nine antennal joints on each side. Yet all the other characters of structure and habitus refer the species here, while it would be otherwise associated with entirely incongruous material. Under the circumstances I regard the 9 joints as accidental, and shall expect other specimens to show the typical 10 jointed form.

L. longispina, sp. nov.

Oblong, nearly parallel, ferruginous brown, feebly shining, sparsely clothed with yellowish, erect hairs, longer and more dense on the thorax, shorter on the elytra, where they form distinct rows on the costæ similar to those of *hirticula*. Head densely and coarsely punctured, with moderately long hair, clypeus emarginate, the border moderately reflexed. Thorax widest at middle, slightly narrowed at base, more at apex, the margin feebly crenate, ciliate, basal margin channelled externally, surface with coarse punctures moderately closely placed, with long erect hairs. Elytral punctures much finer than those of the thorax, less impressed, denser and somewhat rugulose, the hair sparser and shorter than on the thorax, the discal costæ not distinct, marked only by the rows of longer hair. Pygidium of male sparsely and not deeply punctate, not hairy. Metasternum densely punctured, the hairs

yellow, long and dense. Claws arcuate, a strong acute median tooth. Length, .68 inch = 17 mm.

Habitat—South Carolina (Morrison), Grand Ledge, Mich., May 24th, (Schwarz).

MALE.—Antennal club a little longer than the stem. Abdomen slightly flattened at middle, the penultimate segment with a transverse, arcuate, rugulose elevation, behind which is a concavity. Last ventral flat. Inner spur of hind tibia fully as long and scarcely stronger than the outer.

FEMALE.—Wanting.

Three specimens of this form, which is perhaps confused with *hirsuta* (with which it agrees in group characters) in collections, are before me, all of them males. It is readily known by the almost equally long spurs of the male, and by the distinct lines of longer hair on the elytra. The thoracic margin is also evidently, if not strongly, crenulate.

L. innominata, sp. nov.

Oblong oval, convex, chestnut brown, shining. Clypeus moderately deeply, acutely emarginate, the border moderately reflexed, surface rather closely and coarsely punctate, front less densely and more coarsely punctate. Thorax, sides arcuate, narrowing rather regularly toward apex, the margin scarcely irregular, not crenate, with long ciliæ, the punctures small, sparse and irregularly placed, no median line, a distinct channel along the base externally. Punctures of the elytra more coarse and dense than those of thorax, the costæ evident, but not prominent. Pygidium sparsely indistinctly punctate. Metasternum punctate, the hair (♂) long and abundant. Abdomen indistinctly punctate at the sides, the last two segments more coarsely punctate. Claws arcuate, a long acute median tooth, smaller on anterior tarsi. Last joint of maxillary palpi fusiform. Length, .72 inch = 18 mm.

Habitat—Winona, Minn., U. S. N. Mus. Acc. 21542.

MALE.—Antennal club as long as the stem. Abdomen flattened and slightly concave at middle. Penultimate segment with a rather feeble, semicircular depression on each side of which is a short oblique tuberosity. Last segment transversely concave, almost cupuliform. Inner spur of hind tibia rather more than half the length of the outer, stout and straight.

FEMALE.—Unknown.

This species is known to me in a single male specimen only. It is intermediate in some respects between *implicita* and *balia*, yet abundantly distinct from either. The male characters are more like those of *implicita* save that the last segment is concave, but the very smooth, sparsely punctured thorax is distinctive. This species is also much larger than its immediate allies.

L. antennata, sp. nov.

This species is intermediate between *tristis* and *crinita*, while evidently distinct from both. It has the size, vestiture, and general habitus of *tristis*, but the smooth, shining surface of *crinita*. The female is recognizable by the shining surface, associated with the vestiture of *tristis*. The antennæ of the male have the club distinctly longer than the stem, and much longer than in *tristis*, without attaining the abnormal development of *crinita*. Size of *tristis*.

Habitat—Texas.

The collection of the U. S. Nat'l Museum contains a long series of males, and but a single female. There is no variation whatever, except a very slight one in size. The ventral characters are as in *tristis*. I have seen other specimens than those in the Museum Collection, and all are from Texas. It is probably common locally.

I shall be glad to name *Lachnosterna* for collectors for the privilege of keeping what may prove desirable for study.

Editorial Notes.

As will be noted from the first page of the cover, there has been a complete change of the editorial staff of ENTOMOLOGICA AMERICANA. At the April meeting of the Society Mr. Hulst resigned his editorial position on the plea of lack of time to properly attend to the work, and insisted on his resignation notwithstanding the decided disinclination on the part of the Society to accept it. A unanimous vote of thanks for able manner in which he had conducted the Journal, was tendered Mr. Hulst. Mr. Roberts thereupon followed the example of Mr. Hulst, and on the same plea—business engagements—resigned his post as assistant, a resignation also reluctantly accepted. The choice of the Society for the vacant positions fell upon myself as editor, and Mr. F. H. Chittenden as assistant editor. Being again settled so near New York City as to be practically of it, I have accepted the office, and we are now back in the editorial chair, ready to poke advice or criticism at those who need or deserve it. The chair feels familiar, but it has grown since we were last in it, and our readers must indulge us a little, until we learn to fill it as well as our predecessor. As Mr. Hulst will continue to contribute as heretofore, and has promised us his assistance, we hope to satisfy all reasonable demands.

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We have received Bulletin No. 1 of the Central Experiment Station at Washington, which contains some information of entomological interest which we will try to present to our readers in the next number.

Collecting Lachnosterna.

By C. H. Roberts.

As the season approaches for collecting this genus, I am induced to tell of a method which was new to me until last Spring, and which proved very remunerative. It was my good fortune to spend a couple of weeks in Washington, D. C., last May with that band of well-known entomologists and enthusiastic collectors, gathered there, and they initiated me—taught me the trick *i. e.*—beating.

Given a clump of Oak or Hickory trees (young ones preferred), situated near a lawn, meadow or pasture; an umbrella, beating stick, lantern, plenty of good sized bottles, charged with cyanide or chloroform, and if possible a companion, and you are ready—when night comes.

The beetles begin to emerge from the ground at about dusk and fly to the trees to feed.

As long as any light remains you can hand-pick them, but when it becomes dark, or if they appear in large numbers, you open your umbrella and the beating process begins. If the locality be a good one you will be astonished at the result. You want the lantern to examine the umbrella with, and your companion to hold it and the umbrella.

While in Washington four of us went out in this way and we took nearly *two quarts*, or almost a *thousand* specimens in an hour and a half. Six or seven species were represented. Oak and Hickory are of course not the only food plants, but seem to be favorites.

One species, *affinis*, was quite commonly taken upon an old oak which grew near my friend's house, and seemed to be rare everywhere else. *Affinis* suddenly disappeared after a few days, and then the pear trees in the garden were savagely attacked by *hirticula* and *fusca*, or rather *arcuata*, Smith, n. sp. It for some time seemed as if they would destroy the trees, so vast were their numbers; and I am not sure but that they would, were it not for the hand-picking of myself and friend.

After my leaving, my friends took many hundreds of specimens, and many species in this way.

Upon my return to New York I tried the same method in one of our small parks and succeeded very well, although the season was getting late. I was once disturbed by a gray-coated "guardian of the peace," but I finally *persuaded* him that he was wanted in another part of the park and the good work went on.

Collecting about electric lights, especially when they are near parks, and not too far from the ground, is productive of very good results, but beating goes beyond anything in my experience.

The beetles seem to fly mostly from dusk until ten o'clock, although some specimens have been taken as late as midnight.

NOTES UPON GRYLLUS AND ŒCANTHUS.

By Jerome McNeill, Moline, Ill.

The species of *Gryllidæ* are so variable that it is practically impossible to say at present how many good species there are in the United States or even what constitutes a single good specific character. The result is that a great many more species than exist have been described (Mr. Walker, for example, is credited by Saussure with having added eight synonyms to *G. assimilis* Fabr.,) and the habits of distinct but similar species have been confused. The latter conclusion has been forced upon me after several years observation and I venture to offer my solution of the difficulty in this paper. I do not hesitate to say however that I do not feel at all sure of the correctness of my position but if I succeed in calling the attention of other observers to this very interesting group, I shall be well paid for my trouble.

In speaking of the habits of these *Orthoptera*, a late writer on the subject, Mr. Lawrence Bruner, says: "Usually most of our North American *Grylli* live singly or in pairs in burrows which they dig for themselves. These are used as retreats during the day-time and serve as shelter during the ordinary inclemencies of the weather. These burrows are generally forsaken about midsummer for some sort of above ground shelter. From this time on until Fall they appear to be more social and live in colonies under various sorts of rubbish. Grain-shocks are a favorite haunt for them and since twine has been used for binding, the crickets have been quite troublesome by cutting the bands. During the late Summer and Fall the females commence preparations for the continuance of their kind, by thrusting their long slender ovipositors into the loose soil and dropping their eggs. These sometimes hatch the same year but as a rule lie over until the following Spring. The young generally live above ground where they hide among fallen leaves, grasses and other debris, though sometimes they also creep into chinks and crevices in the earth." If I am not mistaken the description just quoted applies to no single species. The burrow-making species is *G. pennsylvanicus* Burm., or, if this name is as Saussure believes only a synonym, *G. luctuosus* Serv. The social crickets are *G. abbreviatus* Serv., and *neglectus* Scud., which is probably a variety of Serville's species. Briefly recounted, the life history of *abbreviatus* is as follows: The eggs hatch in this latitude in July, and the first adults appear as early as the second week in August. During every stage of life they are social, feeding together, seeking shelter in company, and when egg-laying times comes, in October, the females collect by hundreds in some suitable locality, an abandoned or little used roadway suits them well, where they deposit their eggs, each female laying several hundred, in an irregular mass. After this duty is performed their business on this planet seems to be finished and they succumb to the increasing cold, none surving the Winter. The eggs do not hatch until the following July or if in rare cases they do hatch, the larvæ probably perish with cold. In Florida *Gryllus luctuosus* Serv., attains its growth in December. *Gryllus pennsylvanicus*, probably the short-winged form of *luctuosus*, is, so far as I know, not found in the Southern States, and in the Middle States it does not have time to complete its metamorphoses in the Fall, and conse-

quently survives the Winter in the larval and pupal stages. In the Spring it soon completes its transformations and by the first of June its note is heard. They dig burrows and these they occupy probably as long as they live. During the months of June and July the meadows and pastures and especially the wood pastures are filled with the music of their song. Ordinarily in favorite haunts every square rod will contain at least one burrow and these burrows are of course frequently much more abundant. The males never seem to stray away from their homes in the day-time and are often found singing just within the entrance. Where their eggs are laid, or when, I have never been able to discover, but I have never seen the young before September, so that the eggs are probably laid about the time that *G. abbreviatus* Serv., are hatching. *Gryllus pennsylvanicus* Burm., is so far as I have observed never a social species, not even in the feeding stage. *Gryllus abbreviatus* Serv., are always social and never burrow-inhabiting, although it is very probable that they make occasional use of the burrows of their congeners. Mr. Scudder says in his "Distribution of Insects of New Hampshire,"—"At Jefferson in 1867 no chirp of a cricket was heard until Aug. 12, although they often commence their song in Massachusetts in June." If I am right this absence of the cricket serenade in New Hampshire during the months of June and July and early August is accounted for by the fact that this locality is north of the range of *G. pennsylvanicus*. This species has not been I think reported from Canada, and *Gryllus luctuosus* Serv., is rare, so that if I have not erred there should not be heard anything more than an occasional cricket chirp in that part of North America before the middle of August. It may be well to add in conclusion that the only invariable and easily recognized difference between the two species is that in the female of *G. pennsylvanicus* the ovipositor is decidedly shorter than the body, including the head; in *G. abbreviatus* this organ is nearly or quite as long as the insect itself.

There are five species of *Œcanthus*, or tree crickets, in the eastern part of the United States and these are widely distributed over North America. Two, *Œcanthus fasciatus* Fitch, and *Œcanthus angustipennis* Fitch, have generally been considered varieties of *Œcanthus niveus* De Geer, but two years observation of this genus has led me to conclude that they are quite distinct in structure, habits and song, and they must therefore rank as species. The last named species can be distinguished from the two former by its broader wing covers, the width of the dorsal field compared with the length being about one to two in *niveus*, as well as in *Œcanthus latipennis* Riley, one to three in *angustipennis*, and two to five in *fasciatus*. The average of these dimensions is in the first mentioned species .26 to .54 inches; in the second .30 to .62 inches; in the third .16 to .44 inches and in the last .18 to .46 inches. *Niveus* can usually be distinguished from all the other species by its color which is ivory white, with almost no perceptable infusion of green in the male but the elytra of the female may be quite decidedly green. In *angustipennis* the male as well as the female probably is deeply suffused with green. In *fasciatus* the greenish tint is also predominant in the wings and elytra, while the other parts of the insect vary in color from uniform deep black to ivory white varied with fuscous or black. In typically colored specimens however the head and pronotum are whitish with three distinct

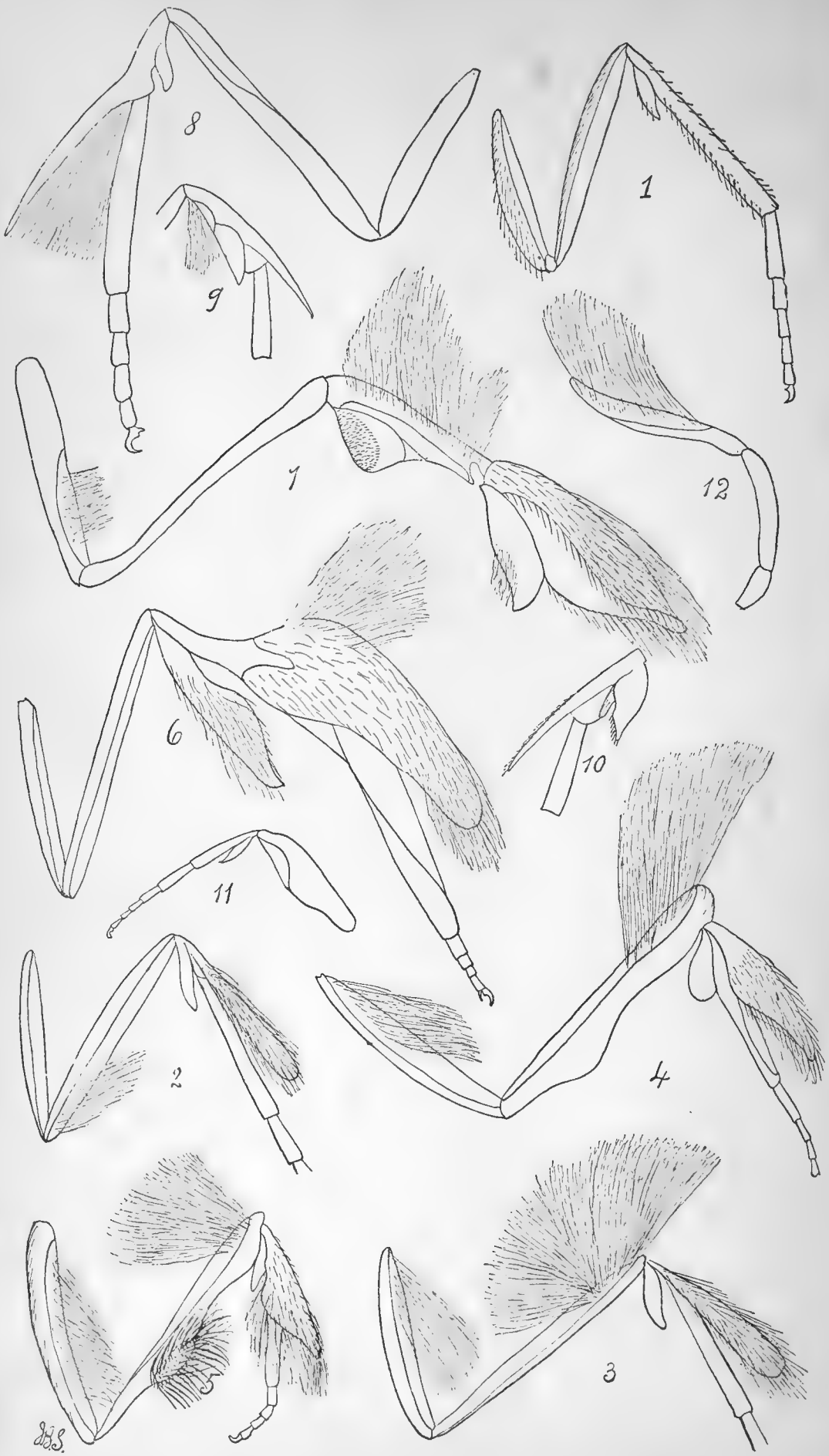
fuscous or black stripes extending, one over the top of the head and pronotum and the other two on the lateral lobes of the pronotum and upon the sides of the head. *Latipennis* differs in coloration distinctly from the two last mentioned species but only slightly from *niveus*. Like the latter its general color is ivory white with the elytra perfectly transparent, but it is distinct from *niveus* and the other two species in having the head and the basal half of the antennæ suffused with pink or light brown. It also lacks very generally if not always, the fuscous spots which are always found upon the lower face of the two basal joints of the antennæ. *Niveus* is farther distinguished from all other species by its proportionally longer maxillary palpi. This disproportion is most apparent in the ultimate joint which is not only relatively but actually longer than the same joint in *latipennis*, a decidedly larger insect. These dimensions are for the two species mentioned respectively: fifth joint 1.5 mm. and 1.4 mm; fourth joint 1.3 mm. and 1.3 mm.; third joint 1.6 mm. and 1.7 mm. Finally in *niveus* the outer, or fourth, curved oblique nerve at the base of the elytra is more angular than in any of the other species and consequently the space between the third and fourth nerves, which in the other species is about equal in width to the space between the first and second and the second and third, is in *niveus* much greater. In addition to the distinctions already mentioned, *fasciatus* has longer antennæ than the other species have, these organs being more than two and one-half times the length of the insect. It is also remarkable for having the longer series of spines at the tip of the posterior tibiæ very large, for this genus, strong and acute. The ovipositor of the female is also distinct from the perfectly straight ovipositor of *niveus* in being plainly turned up at the tip. Finally the maxillary palpi offer distinct specific characters in the proportionally short fourth joint and in the shape of the fifth joint which is subclavate instead of fusiform as in the other species. *Angustipennis* differs from the other forms in its small head and slender pronotum, which in the female, especially, is decidedly narrowed anteriorly, instead of being equal in width throughout as in the females of *niveus* and *latipennis*. The hind legs are also proportionally longer and more slender, and the post tibial apical spines are so weak as to be somewhat difficult to distinguish with the unaided eye. These species differ from one another in song as markedly as in structure. That of *niveus* is the well-known *trrr-ree, trrr-ree,* repeated without variation or pause sixty or seventy times in a minute. In the vicinity of Davenport this song is heard as early as the twenty-third of July and it continues until the persistent little singers are killed by the heavy frosts of late Fall. This song is heard only at night and occasionally on cloudy days but in the latter case it is only an isolated song and never the full chorus of the night-song whose vibrations in exact unison produce that "rhythmic beat" as Burroughs has happily phrased it, which is so characteristic. It is the effect of many united songs that has led the same author to speak of "purring crickets." Thoreau calls it the "slumbrous breathing" and the "intenser dream" of crickets, but Hawthorne has given it a still more spiritual interpretation. He describes it as "audible stillness," and declares that "if moonlight could be heard it would sound like that." Prof. C V. Riley says of the song of *latipennis* that it is continuous and recalls the trilling of a high-pitched dog-whistle in the distance." He also says "The commingled shrill of this

species recalls also the distant croaking of frogs in the Spring." The song of *fasciatus* is also a high trill continuing usually for several minutes but the length of the note is very variable as is the interval between the notes. It sings all day as well as all night, in the bright sunshine as well as on cloudy days and in the dusk of evening. *Angustipennis* has a song which resembles that of *fasciatus* in some degree, but it is very much fainter and lasts only from three to five seconds with an equal interval between the trills. Mr. Scudder says* of the song of *niveus*: "The day-song of this insect is exceedingly shrill and may be represented by the following figure [a musical notation representing a trill] though the notes vary in rapidity. When slowest they are about sixteen to a second. The song is of varied length, sometimes lasting but two or three seconds, sometimes continuing a minute or two uninteruptedly; it is a nearly uniform equally sustained trill, but the insect often commences its note at a different pitch from the normal one as if it required a little practice to attain it. When singing the tegmina are raised at fully a right angle to the body. The night-song consists of *thrr* repeated incessantly, three parts of song and one of rest in every three seconds." The "day-song" described by Mr. Scudder seems to be the song of *fasciatus*, while the "night-song" is a good description of that of *angustipennis*. In conclusion *latipennis*, according to Prof. Riley, generally chooses the tender shoots of the grape in which to lay its eggs, while *niveus* prefers the raspberry or blackberry, but is much less particular than the first mentioned species and frequently lays its eggs in the tender twigs of several other shrubs and trees. Both of these species as well as *angustipennis* prefer cultivated ground, but *fasciatus* is comparatively rare in such localities but is abundant along weedy roadsides and hedges and in meadows overgrown with rank weeds. The females are abundant in late Summer and early Fall on the various species of *Solidago* and *Helianthus* particularly when these grow about the edges of meadows and cornfields. Walker's species *Œcanthus nigricornis* is, I think, nothing more than a long-winged dark variety of *fasciatus*. Specimens of the latter with wings extending beyond the elytra as much as .16 of an inch are not uncommon, and as Walker's description does not contain other plain characters his name should give way to the older one of Fitch. The last of the five species referred to at the beginning of this paper is *Œcanthus bipunctatus* DeGeer. It is at once distinguished from the other species of the genus by the lower margin of the lateral lobes which is emarginate in the middle instead of straight or slightly convex and by the spotted elytra. I am not acquainted with its song and it has never, I think, been described.

Society News.

Brooklyn Entomological Society.—*Feb. 5th, 1888.*—16 persons present. The Curators reported the arrangements for the Exhibition of specimens on February 14th. Mr. Weeks gave some notes on the methods of collecting *Rhynchophora* and on the food habits of several species. Mr. Jülich added notes on *Aphrastus tæniatus* and other species observed by him.—*March 5th, 1889.*—17 persons present. The Report of the Exhibition Committee was presented and adopted, and considerable discussion as to the cabinets and boxes to be adopted for the Society was had. A large mass of routine business was disposed of. The food and other habits of local *Cerambycidæ* were discussed by Messrs. Weeks, Dietz, Hulst, Angell and Meeske.

* Boston Journal of Natural History, Vol. VII, No. IV, pp. 365 and 366.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CONTRIBUTIONS TOWARD A MONOGRAPH OF THE NOCTUIDÆ OF TEMPERATE NORTH AMERICA.

By John B. Smith.

It is now several years since I first began the study of the North American *Noctuidæ*, with the intention of eventually producing a monographic work on the species. In this intention I was encouraged by the assistance of Lepidopterists generally, and first began where I ought to have ended—with a critical review of the genera of our fauna. This was published in the Bulletin of the Brooklyn Entomological Society, and the work, crude at best, gained nothing from the fragmentary manner of publication. Yet the paper was a useful one, since we had nothing of the kind previously, and it has formed a basis upon which new experience has been continually added, and will continue to be added, until such time as a new and more complete work, covering the same subject, can be produced. Since that time I have published on the *Heliothinæ* in the Transactions of the American Entomological Society, and have described a few species, mostly in the Proceedings of the United States National Museum. About six years ago I was employed by Prof. Riley as a field agent of the U. S. Department of Agriculture, to make observations for the Entomological Division. Prof. Riley was greatly interested in the work I had begun, and gave me every assistance and encouragment in his power. As many of the species were injurious, and he had already worked out the habits of a large number and had notes on many more, we finally agreed upon a conjoint work on the family, which might be published by the Government, and which should contain a full summary of all obtainable information original and com-

piled, and be abundantly illustrated with colored figures. Work with this object in view was steadily continued for a time. Prof. Riley and I worked as well as we could apart, on the lines agreed upon between us, and a great lot of manuscript was gradually accumulated which it was intended should be worked up and completed when we could get at the labor together.

The opportunity for this closer co-laboration seemed to offer when I became Assistant Curator in the Department of Insects of the U. S. National Museum at Washington, but I soon found myself fully employed otherwise, and Prof. Riley, what with ill health and his numerous other duties, found less and less time to give to the conjoint work, so that the monograph originally proposed was never completed. Aside from these considerations, other influences helped to dampen our ardor in prosecuting the work to final issue. One was Prof. Riley's excessive caution and the desire of getting at *all* the information known and unknown concerning a species, which tended to check rapid work, the other the difficulty, if not impossibility, of getting a sufficient appropriation for the publication of a monograph so elaborately illustrated as we had planned this should be.

I found time however, in the midst of other work to prepare a number of descriptions, and to make use of the excellent library facilities at hand, and accumulated a great lot of material of use when systematic work should again become possible. When, recently, I accepted the position of Professor of Entomology at Rutgers College and Entomologist to the Agricultural Experiment Station of New Jersey, it was agreed between Prof. Riley and myself that the joint work as originally planned should be abandoned, and that, while mutual co-operation should continue, the results should be published as most convenient. It was realized that the fauna is not yet sufficiently known to enable a work to be carried on for several years without antiquating the beginning before the end was reached, as new material from new regions was constantly turning up. In consequence I shall, under the title of this paper, and the sub-title of the particular genus or group treated, publish as fast as they can be revised, the studies made by me on the *Noctuidæ*, omitting only certain special groups and genera which Prof. Riley has more particularly worked upon. No particular order will be observed, and no one publication will be selected for all the papers, but so far as possible each paper will be complete in itself, save when special considerations render advance publications of fragments desirable. The material upon which these studies are made is principally in the National Museum, but Messrs. Hy. Edwards, E. L. Graef, Geo. D. Hulst, B. Neumoegen, Fred. Tepper, A. W. P. Cramer, J. Doll, Geo. Frank, and many others

have kindly placed at my disposal such material as I needed, and to them I give sincere thanks for the assistance rendered me. Prof. Riley's material I have constantly used as my own, and owing to the many bred specimens contained in it, it was most valuable in deciding specific limitations. Finally I would ask all those who are interested in this family and desire to aid me in future work to send me for study such local material as may be most abundant with them. *Everything*, even the most common species are desirable. I will gladly name in return, all those forms which they may find difficulty in identifying.

Some Modifications in the Leg Structure of Deltoid Genera.

Among the most interesting groups of the *Noctuidæ*, are the *Deltoids*. The group has been variously referred to the *Pyralidæ* or *Noctuidæ*, but seems to me better placed with the latter. It is a very decidedly peculiar one, offering many striking characters, yet impossible of such definition at present, that family rank can be accorded to it. The genera and species were among the first studied by me, and the manuscript is over four years old. Since it was written I have seen many more specimens, and have been able to complete my knowledge of species. In consequence the work must be largely re-written to bring it up to my present knowledge. One of the most attractive features of the study of this group was found in the secondary sexual characters, and more particularly those tuftings of the fore legs which might be considered as scent organs. Striking as these structures are, they have been completely overlooked, only the most casual references to them being found, and while the similar though differently placed tuftings in the *Sphingidæ* were carefully studied, the beautiful characters of the *Deltoids* recived no attention. I first gave a sketch of these structures at the Philadelphia meeting of the A. A. A. S., before the Entomological Club, and afterwards called attention to them before the Biological Society of Washington. On these occasions I also called attention to some of the peculiarities of antennal structure, which will not be considered here. In view of the fact that it will be some time before the revision of my manuscripts can be completed, and of the interesting and important nature of these structures, I have concluded to publish in advance of the systematic portion of my work, a brief description of the more prominent modifications, aiding the verbal descriptions by figures.

In the more typical genera of the *Noctuidæ* —the *non fasciatæ* of Mr. Grote—we find little in the way of secondary sexual characters, while as a rule the primary characters are well developed and specifically peculiar.

In the *fasciatæ* on the contrary, the primary characters become indefinite, weak, hardly worthy of close study, while the tendency to secondary characters becomes marked. There is an especial leaning to tuftings or other modifications of the legs, many of which have long been known, but—as in the case of *Catocala*—have been only recently brought to the attention of entomologists. *Remigia latipes* indicates by its name the effects of the tibial and tarsal tuftings, while under the name *Coptocnemia*, Zeller described as a *Deltoid* the contorted and tufted posterior tibia of *Pleonectyptera* Grote. In the *Deltoid* genera the modifications of leg structure are confined to the anterior pair, and extend to a complete change in the type of the structure. In *Hypena* and *Bomolocha* there is little modification. The coxæ are grooved to allow the femur to be closely applied to it, the femur is a mere shell into which the tibia can be almost completely concealed. The tarsi are normal, and the tibial epiphysis is close to the base of that joint, and of rather small size. The figure (1) shows the fore leg of *Plathypena** *scabra.*

Megachyta lituralis indicates the type more usually found in the *Herminiinæ.* The coxa is a mere shell, concave anteriorly to receive the convexity of the femur, which has a brush of comparatively short hair near the base, at rest folded into the concavity of the under side. The tibia is modified into a flat chitinous process which begins at the epiphysis, the first tarsal joint being here inserted, and nearly equalling in length the femur. This chitinous process of the tibia is clothed with long scales and hair, but no tuft or pencil of hair. This structure is shown at figure 2, and marks the simplest form of this type.

Chytolita morbidalis is after the same general type, but marks an important change. The coxa is as before, but there is a pencil of long hair inserted at the base, resting in the concavity, and capable of being spread fan-like. The femur here has the concavity *upward*, and at the tip is a thick pencil of long hair spreading out fan-like, as in the figure, and normally reposing in the concavity. The tibial structure is as before, save that the clothing of hair is much longer and more dense, much more so than shown in the figure (fig. 3). The 1st tarsal joint is long as in *Megachyta.* When in repose, the pencils of hair folded, the femur closely appressed to the coxa, no part of this structure is visible, and the tibial process meeting the casual view and densely clothed, is usually considered the folded tuft. The structure in some European *Herminia* is identical, or nearly so.

* In this paper I use the generic terms used in Mr. Grote's catalogue as a matter of convenience, since synonymical matter is better left to the systematic part of the work.

Zanclognatha (fig. 4, *lævigata*) marks another advance on this type of structure. The coxa as to form and tufting is much as before, but stouter. The femur still convex below, concave above, is dilated about one-third from base, while the apex is thick, obtusely rounded. A heavy pencil of long hair, making a beautiful fan when fully expanded, is inserted in the concavity, near the tip. Somewhat within the tip beneath, are inserted the modifications of the tibia. The epiphysis is here only united at the extreme base with the tibial process, which assumes a shield-like form, widest before the middle and narrowing to a rounded tip. The first tarsal joint is now also involved in the modification, and is hollowed out beneath the protecting tibial process. Its point of insertion becomes merged at the base with the insertion of tibia. In accord with the modification of the first tarsal joint, the other joints begin to shorten, until they do not equal in their combined length the length of the first joint.

Pityolita pedipilalis (fig. 5) while essentially similar to the preceding marks a further advance or change in structure. At the point on the femur indicated by a dilation in *Z. lævigata*, we find here a pitted surface, surrounded and beset by long scale-like hair somewhat enlarged at tip. The tuftings are more dense, the hair and scales of the tibial process longer, while the tarsal joints from 2 to 5 become still shorter.

With *Philometra longilabris* (fig. 6) we enter into the bizarre, but still on the same line of modification. The coxa is much reduced in size, a mere shell, and not tufted. The femur is long, slender, also a mere shell *convex* above, reverting thus to the *Megachyta* type, and entirely without tuftings. Attached to these frail supports, is a most extraordinary development of tibia and tarsus. There is here a distinct tibia with an enormous epiphysis at base, exceeding in size the shank of the tibia. To this shank however is attached a huge process, still retaining the general form indicated in previous genera, but exaggerated in each dimension. This process is furnished with a pencil of hair on the upper side near its base, and is densely clothed with long hair and scales. From the interior of this development issues the first tarsal joint, fully as long and much stouter than the femur, and excavated in front where it is protected by the tibial process. To this exaggerated first joint are added four small additional joints, as a whole not equal to one-fourth the length of the first joint.

Litognatha nubilifascia (fig. 7) caps the climax of development in this line, and presents a re-arrangement of parts, scarcely indicated, even in *Philometra*. The coxa is stout, and of moderate length, the apical half excavated in front and furnished with a tuft of rather short hair. The femur is long and slender, apparently a complete shank and not a

mere shell, and not tufted in any way. To this is attached the tibia joint which is short and stout, dilated basally, the underside of the dilated portion modified into a rounded cushion or pad with a pitted surface set with short hair. The upper side is furnished with a tuft of long hair, spreading fan-like. To the end of this joint are attached the epiphysis and the shield-like process, similar in shape, but the latter very much the larger and densely clothed with long hair and scales. The tarsi are entirely wanting. When this unique structure is folded up and closely appressed to the thorax its peculiarities are entirely marked. In the congeneric *Pallachira bivittata* Mr. Grote evidently had a specimen with partly extended legs for he remarks that the fore legs seem aborted.

In *Bleptina caradrinalis* (fig. 8) we find the extreme of a somewhat different type of structure. The coxa is moderate in length, a mere shell; the femur is very long and is a flat plate with the edges slightly bent over at sides. The tibia is short, stout, with a moderate *epiphysis* and a very long process from the tip, gradually narrowing to a point. The first tarsal joint is very long, slightly exceeding in length the tibial process, and between the two, attached to the inner side of the process at base, is a pencil of hair reaching to its tip. The remaining tarsal joints are together rather more than half as long as the first. When the tibial process is appressed to the first tarsal joint, no trace is visible, either of the pencil of hair or of the abnormal length of the tarsal joint.

In *Renia* (fig. 9) there is a decrease of modification. The tibia is more normally proportioned, the process shorter, and the tuftings are reduced to a small brush at the base of the inner side.

In *Torticodes* (fig. 10) there is a still further reduction in the modification, and no brush of hair.

Finally in *Epizeuxis* (fig. 11) the leg structure is nearly normal, the femur being clavate, and excavated beneath so as to receive the tibia.

In *Palthis* (fig. 12) the male palpus is peculiarly modified to accomodate a great tuft of hair—much greater than indicated in the figure —but this is given merely as an illustration of a different location for these tuftings.

What is the purpose of these structures? That they have a purpose must be assumed, and as they occur in the male only they may be taken as matter of sexual importance, especially as they are accompanied by striking antennal modifications which I will describe at another opportunity. Müller and others consider them scent organs, and this explanation is the only one that has any appearance of reason. In *Hepialus hecta* the cellular structure of the modified tibia has been examined, and large gland-like cells have been made out. In some of my preparations I am very certain a similar structure can be made out, but the mounted

specimens were not prepared for such investigations and I cannot be sure. There is an excellent field here for the histologist or close anatomical student, rather than for the mere systematist to whom structure is valuable mainly from the assistance it gives him in the classification of the specimens.

EXPLANATION OF PLATE.

1—Fore leg of *Plathypena scabra*, ♂.
2— " " *Megachyta lituralis*, ♂.
3— " " *Chytolita morbidalis*, ♂.
4— " " *Zanclognatha lævigata*, ♂.
5— " " *Pityolita pedipilalis*, ♂.
6— " " *Philometra longilabris*, ♂.
7— " " *Litognatha nubilifascia*, ♂.
8— " " *Bleptina caradrinalis*, ♂.
9—Fore tibia of *Renia* sp., ♂.
10— " " *Tortricodes bifidalis*, ♂.
11—Fore leg of *Epizeuxis æmula*, ♂.
12—Palpus of *Palthis angulalis*, ♂.

A Plague of Psocids!

Somewhere recently,—I think in "Insect Life," but have not the paper handy—there appeared an account of an invasion of *Psocids*, which it was found almost impossible to get rid of. Two exactly similar cases came under my notice in New Jersey, but a few days ago, causing considerable dismay since they were considered small forms of *Pediculus vestimenti* left as a legacy by tramps who had been sheltered. They appeared suddenly and in immense numbers, covering the beds, invading clothes presses, congregating on the walls and filling corners. The neat housewife was dismayed, and every remedy known in the battery of housecleaning was brought to bear upon them. The slaughter was great, but so was the supply. Of course the supposed cause of this unusual house-cleaning was carefully kept secret, and imparted to me only in the strictest confidence, together with a mutilated specimen for examination. Though not sufficiently perfect to identify the species, there was enough of the specimen to enlighten me as to the nature of the attack, and to enable me to afford consolation and advice. I have found that where they appeared on a small scale, naphthaline is a sovereign remedy for *Psocids*, and I have no doubt it will work equally well on a larger scale.

Nemeophila plantaginis, *Linn.*

By David Bruce.

Brockport, N. Y.

This species is rather common at Clear Creek and Platte Cañons, Colorado, at from 7,000 to 10,000 feet elevation, both sexes flying rather briskly by day in June and July. I obtained a few eggs from a worn female, and reared several broods in succession, carrying a number through hibernation. The parent female had yellow and black underwings and of the bred examples I have almost every possible variation. Some have underwings entirely black ; some black with one white spot, with spot and band ; some with white underwings with black rays, and many with yellow instead of white : the markings and colorations of the upper wings are also as variable. Of course all this proves these are but one species, yet I have not seen any examples exactly like the typical form of *N. plantaginis* from Europe, the difference being about as perceptible as that between *Euprepia americana* and *E. caja.*

The eggs were light wax yellow and hatched in 8 days. The young larvæ were dark gray, changing to jet black at first moult ; at third moult a brown dorsal patch appeared ; when full grown the larvæ were as follows : Body velvety black, rather sparsely covered with spreading tufts of fine, stiff, yet silky hairs, springing from glittering steel-like tubercles. The head and hairs on the first three segments jet black. A cape-like patch of chestnut colored hairs covers the median third of back, formed by 6 tufts on 5th and 6th segments, 4 on 7th, and 2 on 8th, the rest of the body clothed with black hairs, becoming longer and more silky on the two posterior segments and a few long white hairs are mingled with them. The lower side of body is fringed with yellowish-brown hairs from two tufts on each segment along the spiracles. The pro-legs and underside of body livid, the true legs jet black.

The larva fed by night, basking in the sun by day, when possible, and are the most lively and shy of my Arctian larvæ, dropping to the ground and quickly hiding if disturbed. They also have a trick of curling themselves and suddenly springing open, thus jumping several inches off the food plant. When full-fed they crawled into the upper corners of the breeding cage or down into the moss indifferently, formed a very slight web, and pupated. Imago appearing in two weeks. I fed them on narrow-leaved plantain, that plant not dying down in the winter like the broad-leaved species.

Phycitidæ and Galleriidæ of North America. Some New Species and a General Catalogue.

By E. L. Ragonot.

Since the publication of Mr. Grote's Check List a great number of North American *Phycites* have been described so that it has become necessary to give a general catalogue of these insects. Thanks to the kindness of Mr. Hulst I have been able to study the greater number of his species so that the catalogue which follows may be considered as revisional and at the same time as the expression of my views on the classification of the *Phycitidæ*. All the species have been studied by me and I hope to have an opportunity of seeing the rest of Mr. Hulst's species and will then hasten to make any necessary additions and corrections.

The following four species are new to science :

Myelois subtetricella Rag.

19—22 mm. Fore wings elongate, oval, very narrow at base, strongly rounded on costa, dark gray, much suffused with brownish, glossy, first line broad, oblique, straight, gray, indistinct, edged outwardly by a shadowy blackish line, second line hardly perceptible, oblique, straight, very narrow, hardly paler than ground color. A dark spot, hardly distinct on disk. Hind wings transparent whitish, smoked on margin. Very near to *tetricella* F.

Hab.—North America, exact locality unknown.

Myelois zonulella Rag.

22 mm. Fore wings hardly dilated posteriorly, pale blackish gray, darker in median area, lines pale, edged with black, the first oblique, straight, extending nearly to the middle of inner margin, very broadly edged with black on the outside. Second line oblique, sinuous. Discal spots indistinct, black. Hind wings blackish brown gray. Smaller than *bilineatella*, the costa and inner margin nearly parallel, its hind-wings much darker.

Hab.—North Illinois, 4 specimens in Grote's coll. in Brit. Mus.

Acrobasis minimella Rag.

13—14 mm. ♀. Fore wings short, rounded on costa, dark gray suffused with purple, paler at base, a large black, triangular costal patch after first line, the median area on the inner margin and along the second line reddish fuscous. First line oblique, rounded outwardly, broadening in inner margin, reddish ochreous, preceeded by a vertical rounded ridge of raised black scales, broad on the inner margin, attenuated towards the costa which it does not attain. Second line pale, sinuous, distinct. Discal spots distinct. Hind wings grayish fuscous. Very near *angusella*, remarkable by its small size.

Hab.—Texas.

Saluria dichrœella Rag.

19 mm. Fore wings oval, narrow at base, strongly rounded on costa, costal half whitish, sparingly dusted with reddish brown, the dorsal half grayish brown with a reddish tint, paler on hind margin but sharply defined and rather darker along the median vein. Hind wings even pale yellowish, the cilia slightly darker. Resembles very much my *bipartitella* and also *opacella* Hulst.

Hab.—Texas.

The species of Mr. Grote's Check List amounted to 48, the present Catalogue contains 178 and 5 varieties. Most of these species have been described in the following papers:

Hulst—Trans. of the Amer. Ent. Soc., July, 1886, pp. 161—164.
Hulst—Entomologica Americana, Oct., 1887, pp. 129—138.
Ragonot—Diagnoses of North American Phycitidæ and Galleriidæ. Paris, December, 1887.
Ragonot—Nouveaux genres et especes de Phycitidæ et Galleriidæ. Paris, April, 1888.
Hulst—Entomologica Americana, Sept., 1888, pp. 114—118.

Catalogue of the Phycitidæ and Galleriidæ of North America.

PHYCITIDÆ.

Myelois Hb.
subtetricella Rag.
bilineatella Rag.
zonulella Rag.
alatella Hulst [Acrob.].
rectistrigella Rag.
duplipunctella Rag.

Rhodophæa (Gn.) Rag.
pallicornella Rag.
histriculella Hulst [Acrob.].
exsulella Z. [Myelois].

Acrobasis Z.
palliolella Rag.
albocapitella Hulst.
tricolorella Grote.
amplexella Rag.
Angusella Grote.
caryæ Grote.
minimella Rag.
caryivorella Rag.
rubrifasciella Pack.
comptella Rag.
vaccinii Riley.
juglandis Le Bar. [Pemp.].
indigenella Z.
nebulo Walsh. [Phycita].
zelatella Hulst [Myelois].

Piesmopoda Z.
subrufella Hulst [Neph.].
filiolella Hulst [Neph.].

Phycita (Curt.) Rag.
arctella Rag. [Bahamas].

Phycitopsis Rag.
flavicornella Rag.

Dioryctria Z.
miniatella Rag.
clarioralis Wlk. [Neph.].
Zimmermanni Grote [Pinipestis].
amatella Hulst [Neph.].
pygmæella Rag.
decuriella Hb.
abietella S. V. n. Cat. Zk.
reniculella Grote [Pinipestis].
abietivorella Grote "

Dasypyga, Rag.
alternosquamella Rag.
ab. stictophorella Rag.

Tacoma Hulst.
feriella Hulst.

Promylea Rag.
lunigerella Rag.

Glyptocera Rag.
consobrinella Z. [Neph.].

Orthopepis Rag.
jugosella Rag.

Ambesa Grote.
Walsinghami Rag. [Prist.].
lætella Grote.

lallatalis Hulst [Neph.].
denticulella Rag. [Prist.].
niviella Hulst [Lipographis].

Nephopteryx Hb.

pergratialis Hulst.
Grotella Rag.
scobiella Grote.
decimerella Hulst [Lipo.].
furfurella Hulst.
ovalis Pack.
v. geminipunctella Rag.
v. hypochalciella Rag.
v. curvatella Rag.
fasciolalis Hulst [Pinipestis].
finitella Wlk.
rubrisparsella Rag. [Prist.].
rufibasella Rag.
croceella Hulst [Sciota].
gilvibasella Hulst.
basilaris Z.
reductella Wlk.
Gleditschiella Fern. [Pemp.].
inquilinella Rag.
crassifasciella Rag.
subtinctella Rag.

Meroptera Grote.

pravella Grote [Pemp.].
uvinella Rag.
unicolorella Hulst. [Dior. & Oreana]

Salebria Z.

pumilella Rag.
nubiferella Rag.
tenebrosella Hulst [Neph.].
bistriatella Hulst [Diory.].
quercicolella Hulst [Neph.].
annulosella Rag. [Neph.].
semiobscurella Rag.
subfuscella Rag.
contatella Grote.
v. quinquepunctella Grote.
tarmitalis Hulst.
delassalis Hulst [Neph.].
Fernaldi Rag.
bifasciella Hulst [Neph.].
aliculella Hulst [Myelois].
Oberthuriella Rag.
odiosella Hulst [Neph.].

Laodamia Rag.

fusca Hw.
spadicella Zk.
carbonariella Zk.
posticella Zett.
janthinella Dup.
mœstella Wlk. [Neph.].
undulatella Wlk.
frigidella Pack. [Eudorea].
cacabella Hulst [Pinip.].

Elasmopalpus Blanch.

erectalis Walk. [Trach.].
rufinalis Wlk. [Neph.].
hapsella Hulst [Neph.].
decoloralis Wlk. [Trach.].
metagrammalis Wlk. [Neph.]
lignosellus (a) Z. [Pemp.].
angustellus Blanch.
tartarella Z. [Pemp.].
incautella Z. [Pemp.].
petrella Z. [Pemp.].
carbonella Hulst [Dasyp.].

Selagia Z.

lithosella Rag.

Anoristia Rag.

flavidorsella Rag.

Pyla (Grote) Rag.

scintillans Grote.
æneoviridella Rag.

Epischnia Hb.

ruderella Rag.
Boisduvaliella Gn.
Farrella Curt. [Anerastia].
Lafauriella Const.
albocostalis Hulst [Ephestia]
Fosterella Hulst [Pima].
subcostella Rag.
fulvirugella Rag.
granitella Rag.

Megasis (Gn.) Rag.

polyphemella Rag.
pullatella Rag.

Lipographis Rag.

humilis Rag.
fenestrella Pack. [Pemp.].
leoninella Pack. [Pemp.].
subosseella Hulst [Bahamas].

Hypochalcia Hb.

Hulstiella Rag.

Sarata Rag.

nigrifasciella Rag.
dophnerella Rag.

Etiella Z.

Zinckenella Tr.
shisticolor Z.
villosella Hulst.

Melitara Wlk. (Megaphycis Grote).

prodenialis Wlk.
Bollii Z. [Zopho.].
dentata Grote [Megaph.].

Zophodia Hb.

graciella Hulst [Spermat.].
longipennella Hulst.
grossulariæ Pack. [Pemp.].
turbatella Grote [Dakr.].
Packardella Rag.
glaucatella Hulst [Honora].
dilatifasciella Rag.
ardiferella Hulst [Altoona].

Euzophera Z.

aglæella Rag.
semifuneralis Wlk. [Neph.].
impletella Z.
pallulella Hulst [Stenopt.].
nigricantella Rag.
cuprotæniella Christoph.
ferruginella Rag.
sonorella Rag.

Cateremna Meyr.

tumidulella Rag.

Vitula Rag.

dentosella Rag.
serratilineella Rag.
basimaculatella Rag.

Psorosa Z.

Hammondi Riley [Pemp.].
pneumatella Hulst [Stenopt.].
ulmella Rag.
fuscatella Hulst [Honora].

Lætilia Rag.

coccidivora Comst. [Dakruma]
pallida Comst. "
ephestiella Rag. [Dakruma].

Staudingeria Rag.

albipennella Hulst [Pemp.].

Heterographis Rag.

Morrisonella Rag.
coloradensis Rag.
olbiella Hulst [Mona].
oblitella Z.
propriella Wlk. [Neph.]
undulatella Clems.

Honora Grote.

mellinella Grote.
ochrimaculella Rag.
sciurella Rag.
subsciurella Rag.
canicostella Rag.

Dolichorrhinia Rag.

aureofasciella Rag. [Macro].

Diviana Rag.

eudoreella Rag.

Homœosoma Curt.

impressalis Hulst.
electella Hulst [Anerastia].
texanella Rag.
opalescella Hulst [Ephestia].
tenuipunctella Rag.
illuviella Rag.
candidella Hulst.
uncanalis Hulst [Neph.].
albescentella Rag.
stypticella Grote.
mucidella Rag.
anguliferella Rag.

Ephestiodes Rag.

gilvescentella Rag.
infimella Rag.
erythrella Rag.

Eurythmia Rag.

hospitella Z. [Ephes.].
minutularia Hulst [Dioryct.]
quantulella Hulst [Pemp.].
ignidorsella Rag.

Hornigia Rag.

obtusangulella Rag.
lugubrella Rag.

Ephestia Hb.

fuscofasciella Rag.

Kuehniella Z.
Rileyella Rag.
nigrella Hulst.
elutella Hb.

Plodia Gn.

interpunctella Hb.
zeæ Fitch [Tinea].

Anerastinæ Rag.

Ragonotia Grote.

dotalis Hulst [Neph.].
discigerella Rag. [Ciris].
lativitella Rag.

Tolima Rag.

opacella Hulst [Altoona].

Poujadia Rag.

gemmatella Hulst [Spermat. and Cayuga]

Saluria Rag.

ostreella Rag.
glareosella Z. [Aneras.].
rostrella Rag.
tetradella Z. [Aneras.].
dichrœella Rag.

Martia Rag.

arizonella Rag.

Aurora Rag.

longipalpella Rag.

Navasota Rag.

hebetella Rag.

Hypsotropa Z.

luteicostella Rag.

Peoria Rag.

hæmatica Z. [Aneras.].
rosealella Pack. [Neph.].
bipartitella Rag.

Anerastia Hb.

Ella Hulst [Ephestia].

Bandera Rag.

cupidinella Hulst.
binotella Z. [Aneras.].
subluteella Rag.

Tampa Rag.

dimediatella Rag.

Statina Rag.

roseotinctella Rag.

Cœnochroa Rag.

californiella Rag.
inspergella Rag.
illibella Hulst [Petaluma].
puricostella Rag.

GALLERIIDÆ.

Epimorius Z.

testaceellus Rag.

Melissoblaptes Z.

fuscolimbellus Rag.

Galleria L.

mellonella L.

Paraipsa Butler.

fulminalis Z. [Melissob.].
terrenella Z. ["].
furellus Z. [Melissob.].

Aphomia Hb.

colonella L.

Achroia Hb.

grisella F.

Species incertæ sedis etc.

The following species are unknown to me:

albiplagiatella Pack. (Myelois).
actualis Hulst (Neph.).
auranticella Grote (Pinipestis).
approximella Wlk. (Pempelia).
bifascialis Wlk. (Neph.).
bonifatella Hulst (Sperm. and Tehama).
cestalis Hulst (Anerastia).
caliginella Hulst (Neph.)
Edwardsialis Hulst (Megaphycis).
excantalis Hulst (Anerastia).
Edmandsii Clem. (Neph.).
Fernaldalis Hulst (Megaphycis).
Georgiella Hulst (Myelois).
indistinctalis Wlk. (Neph.).
multilineatella Hulst (Spermat. and Welaka).
oreadella Hulst (Uinta).
obsipella Hulst (Honora).
olivella Hulst (Anoristia).
ostrinella Clem. (Ephestia).
ochrifrontella Z. (Ephestia).
perfuscalis Hulst (Neph.).
rubiginella Wlk. (Neph.).
subcæsiella Clem. (Pemp.).
ulmiarrosorella Clem. (Neph.).
virgatella Clem. (Pemp.)
montinatatella Hulst (Spermat.).
carneeila Hulst (Neph.).

SYNONYMICAL NOTES.

Atrifascialis Hulst (Tallula) is an Epipaschiid.—*Inimicella* Z. (Galleria) is a Tortrix (genus *Pseudogalleria* Rag.).—*nuleolella* Hulst (Pempelia) is a Pyralid (genus *Arta* Grote).—*Khypodella* Hulst (Glyptoteles) is *Neph. curvatella* Rag. possibly.

The Eggs and Larvæ of Cerathosia tricolor, *Smith.*

By Geo. D. Hulst.

About the middle of April, I received a letter from a correspondent in Central Texas, telling me that he had sent by mail a box with some eggs enclosed, of the much discussed *Cerathosia tricolor.* He was, however, unable to give any indication of the food plant. When the box arrived all the larvæ had emerged, and the most were dead, but a few still had life enough to move about, and very much to my surprise were lively little Geometers!

The eggs are spherical, somewhat flattened, and much grooved and grained.

The caterpillars on emerging are about one-eighth of an inch in length, head dark, broad, deeply indented at the summit between the eyes; front triangular with apex at indentation of summit. Mandibles with 5 teeth. The eyes are marked with 8 or 10 scattered hairs.

Body cylindrical, with segments very slightly if at all swollen. Each segment has, rather irregularly located, from 14 to 20 piliferous spots each one with one perpendicular hair, or two divergent ones. Those armed with two hairs constitute about one-third of the whole number. These hairs as well as the body are dark brown or blackish in color.

There are only six pairs of legs in all, the two anterior pairs of abdominal legs being almost entirely aborted, though still evident. They are however in no way used in walking, and the motion of the caterpillar is entirely geometriform, the central part of the body being fully arched, and the hind pairs of legs being brought close to the pro-legs in progression.

To what extent this will clear up the systematic position of the insect, I am unable to say. The spines are decidedly arctiiform, but the existence of 12 legs only in the larva seems to put it where Mr. Grote thinks it belongs, as allied to *Acontia* and *Spraguia.* The larvæ of *Acontia* have, I believe, 10 legs only. The larvæ of the species of *Spraguia* are so far as I know unknown, but the larvæ of the nearly allied European genus *Agrophila* has 12 legs and thus corresponds with the larvæ of *Cerathosia.* As far as I can learn however the larvæ of both *Acontia* and *Agrophila* are naked.

I was unable to find any plant of which the larvæ would partake. Indeed, it is doubtful whether enough strength remained to any to live even if a proper food plant had been found. At any rate the larvæ were not carried beyond emergence from the egg.

NOTE BY EDITOR.

The above communication was presented by Mr. Hulst at the May meeting of the Brooklyn Entomological Society, and proved of course very interesting. Mr. Hulst kindly gave me a slide containing mounted specimens of the larva, for examination. He is quite correct in his description, but I really doubt whether, if he had not seen the mode of progression, he would have found the reduction of size in the anterior pairs of pro-legs, worthy of particular remark. They are undoubtedly much reduced in size, the first pair more than the second, but they are armed about like the perfect legs, and I feel certain that had they been carried through another stage, they would have become normal *Lithosian* larvæ. At the present stage Mr. Hulst's observations, though extremely interesting, can have no systematic weight against the obvious structural characters of the imago. I regret that I have not at command at present the literature of the Lithosiid larva, so cannot compare with known forms. I trust however that the near future will bring other specimens of the larva which can be carried to maturity.

Note on Spilosoma congrua, *Walker.*

By John B. Smith.

The bibliography of this species, as it stands in our lists to-day, is as follows:

Spilosoma congrua Walker.
1855.—Walker, Cat. Br. Mus. Lep. Het., III, 669.
1860.—Clem., Proc. Ac. N. Sci. Phil., XII, 532.
1862.—Morris, Synopsis, Supplt., 343.
1868.—Grt. & Rob., Trans. Am. Ent. Soc., II, 72.
1873.—Stretch., Zyg. and Bomb., 130.
1875.—Butler, Cistula Ent., II, 33, = *cunea*!
1883.—Grote, Can. Ent., XV, 9.
1886.—Hulst, Entom. Amer., II, 15, (larva).
antigone Strecker.
1878.—Strk., Rept. Engin. 1877–78, V, p. 1860.
1883.—Grote, Can. Ent., XVI, 9, = *congrua.*
1886.—Hulst, Entom. Amer., II, 162 = *congrua.*

Habitat.—Mass., New York, Georgia, Colorado. The insect is thus a widely distributed one, though not common anywhere.

Some time since I found it desirable for some reason to compare Walker's description with specimens of what goes, *fide* Mr. Grote, as *congrua.* I believe it was Mr. Strecker's differential description of his *antigone* that first called my attention to it. To my surprise I found

that if Walker's description was in any way accurate, it could not possibly refer to this species, and in casting about for a species to which it could possibly be referred, I picked out of our series of *Hyphantria cunea*, specimens in every way agreeing with the description. So certain did I feel of this, that I called Prof. Riley's attention to it as a necessary correction of synonymy, and afterward stated the conclusion before the Entomological Society of Washington.

Walker's description is as follows: "White. Tarsi with black bands. Fore coxæ and fore femora luteous, with black spots on the inner side. *Male*—Head and fore part of the thorax with a slight testaceous tinge. Primaries with four very oblique, very imperfect and irregular bands, composed of pale brown dots. Length of the body 6 to 7 lines; of the wings 16 to 20 lines."

In 1868 Grote and Robinson state that of three specimens in the B. M. Collection one female was *Spilosoma virginica*, the other specimens, male and female, representing a species approaching *H. cunea* in markings, but stouter and with the antennæ and palpi of *Spilosoma*.

In 1875 Mr. Butler speaks as follows: "The only examples now representing this species in the collection are what I believe to be a male variety of *H. cunea*, and a female (?) *Spilosoma virginica*, without abdomen; what Mr. Walker may have done with the species since Mr. Grote described it, it is impossible to say."

This note of Butler's seems to have entirely escaped American Lepidopterists. Strecker did not refer to it in describing his *antigone*, and Mr. Grote seemed not to know of it when in 1883 he referred *antigone* as a synonym of *congrua*. Mr. Hulst in his paper assumed the correctness of Mr. Grote's identification of *congrua*, and shows that the species varies sufficiently to include the form described by Mr. Strecker. No attempt seems to have been made to reconcile Walker's description with the species as identified by Mr. Grote, and in view of the facts that the description cannot possibly be made to fit *antigone* Strecker, that it agrees perfectly with specimens of *H. cunea*, and that Mr. Butler finds a specimen of *cunea* as a type, it seems to me that *congrua* Walker, must be referred as a synonym of *H. cunea* Dru., and *congrua* ‡ Grote, must be cited as a synonym of *antigone* Strecker.

Mr. Henry Edwards recently showed me in his collection a species of *Spilosoma* apparently distinct from all described species, and which agrees very well with Walker's description save in the maculation of the abdomen.

The genus *Spilosoma* needs revision, and as Mr. Edwards has all the described as well as some new species, he will probably undertake the task shortly.

Some Corrections to Henshaw's List of the Coleoptera of North America.

One of the greatest desiderata in the present state of North American Coleopterology is a full reference and synonymical catalogue. Although such work has been contemplated for several years and is in the best hands that could possibly be selected for this purpose, we are afraid that the publication of such catalogue will be delayed for some time to come and that we shall see a new edition of the check list sooner than the much desired catalogue. This being so, the Coleopterists should cooperate in rendering the new check list as free from errors as possible; for, while it is a comparatively easy task to insert the additions, it is difficult to eliminate the various errors of minor or greater importance which have crept into the former editions of the check list, errors which are inseparable from and inevitable in a work of this character and for which the most careful author cannot be held responsible, but which are liable to be perpetuated from one edition to another unless special attention is called thereto.

For this purpose we publish the following few corrections which were placed at our disposal by Mr. Schwarz:

p. 43—for *Homalium rufipes* Fauv., read *H. rufipes* Fourcroy.

p. 47—omit *Hippodamia variegata* Gœze.

p. 46—for *Adonia constellata* Laich, read *A. variegata* Gœze.

p. 61—omit *Grynochares oregonensis* Crotch, which is a manuscript name.

p. 61—insert before *Monotoma* the family heading *Monotomidæ* to include the genera from *Monotoma* to *Bactridium* inclusive.

p. 78—*Telephorus pusillus* Lec., appears twice, once as a distinct species, and again as a synonym of *rectus*. In the present state of knowledge of this genus the latter reference should be omitted.

p. 83—for *Hadrobregmus pumilis* Lec., read *H. pumilus* Lec.

p. 84—omit *Theca striatopunctata* Lec., which is a manuscript name.

p. 85—omit *Trogoxylon californicum* Crotch, for the same reason.

p. 124—for *Xylita lævigata* Hellw., *Serropalpus* Hellw., *S. striatus* Hellw., read *Xylita lævigata* Hellenius etc.

p. 137—*Apion porcatum* is erroneously placed among the unrecognized species.

J. B. S.

We exceedingly regret hearing of the death of Heinrich Benno Moeschler, of Kronfoerstchen bei Bautzen, Germany. Mr. Moeschler was one of the few European entomologists who had a really good idea of our Lepidopterological fauna, and was able to appreciate the work done on this side of the Atlantic. His death is a positive loss to American entomology. We have not been able heretofore to learn anything of a personal nature concerning him, but hope in an early number to be able to give a brief sketch of his life and of his work so far as American entomology is concerned.

Life Habits of Hispidæ.

Dr. Horn, in describing the remarkable Hispid, *Stenopodius flavidus* (Trans. Am. Ent. Soc., vol. X, 1883, p. 301), suggests that from certain structural characters (apical thoracic margin with a depression each side apparently for reception of antennal club; tarsi not dilated, slender, claw-joint extremely long) that the species has a subaquatic mode of life. In a species coming from the arid regions of Arizona and California we would least expect such mode of life and we look forward therefore with interest toward future observations which may prove or disprove the correctness of Dr. Horn's surmise.

The few *Hispidæ* in our fauna of which the earlier stages, or at least the food-habits are known, are leaf-miners, the larvæ closely resembling in general appearance certain leaf-mining *Tineïdæ (Lithocolletis)*; but the little we know of foreign species indicates a great diversity of life-habit in this family. The earlier stages of the few European species still remain unknown, but since *Hispa atra* is quite abundant it may be inferred that the larva would long ago have been discovered if it were a leaf-miner. Mr. Lucas (Ann. Soc. Ent. France, 1884, Bull., p. V) describes the larva of *Oxycephala speciosa* Boisd., from New Guinea. It resembles in appearance a Crustacean of the family *Cymothidæ* and covers itself with its shiny excrement in the manner of *Crioceris* or *Blepharida* Moreover it is not leaf-mining but lives at the axils of the leaves of *Pandanus*. Another species, *Leptispa pygmæa* Baly, was found by Mr. G. Lewis, near Colombo, Ceylon, "resting on the stems of a small grass just above water; but if immersed, remained quiescent beneath it" (Entom. Month. Mag., vol. XXV, Sept., 1888, p. 94). This seems to indicate a subaquatic mode of life in the larva state, though in the genus *Leptispa* the tarsal joints are short and dilated. In this particular species, however, "the body beneath is covered with the close pilosity common to some insects, such as *Donaciæ*, which are indifferent to immersion in water."

To return to our own fauna, there is no indication that in the genera *Odontota*, *Microrhopala* and *Octotoma* the unity of habit is interrupted. They appear to be terrestrial and leaf-mining in the larva state, and so is in all probability the genus *Charistena*, but our *Stenispas* probably differ in habit. The imagos occur preferably on low, moist meadows or on plants near water and their larvæ are probably either root-feeders in moist ground or subaquatic like those of *Donacia*. J. B. S.

A Reclamation.

In "Insect Life" No. 10, Prof. Riley adds some interesting information concerning *Platypsyllus* and figures both the larva and imago. He gives also a resumé of the literature, but whether intentionally or not, omits all mention of my paper (Trans. Am. Ent. Soc. 1888) in which the larva is fully described and figured. This omission is all the more inexcusable as the first public exhibition of the larva and my figures was made before the Entomological Society of Washington some time in March, 1888, Prof. Riley being present and taking part in the discussion. Geo. H. Horn, M. D.

Cicada septendecim in 1889.

Before and on receipt of this number of ENTOMOLOGICA AMERICANA many of our readers in the Eastern and Middle States will no doubt have heard the song of that most interesting of our North American insects—the Periodical *Cicada*. To anticipate inquiries regarding this insect we desire to state that the Cicadas of the present year belong to the 17-year brood VIII, according to the enumeration introduced by Dr. C. V. Riley in his 1st Missouri Report. This brood is a well-established one, and has been recorded in the year 1786, 1804, 1821, 1838, and 1855. There is further strong probability that this is the brood referred to by Morton in his "Memorial" as occurring in Plymouth, Mass., in 1633 (see Harris, Treatise etc., p. 207, ed. Flint). Its re-appearance in 1872 has no doubt been observed in many localities but, strangely enough, there do not seem to be any records thereof in the more accessible literature, and no one has gone into the trouble of collecting the records—if there be any—from the agricultural papers and similar sources. The extent of this brood, as compiled from all available sources, is given by Dr. Riley as follows: "in the south-eastern part of Massachusetts; across Long Island; along the Atlantic coast to Chesapeake Bay, and up the Susquehanna River at least as far as to Carlisle in Pennsylvania; also in Kentucky, at Kanawha in (West) Virginia, and Gallipolis, Ohio, on the Ohio river."

The Cicadas reported in 1855 from Buncombe and McDowell counties, North Carolina, have apparently been lost sight of, and it is still doubtful whether they should be referred to this 17-year brood VIII or the 13-year brood XVIII, both having appeared simultaneously in 1855. From the localities given by Dr. Riley for the brood XVIII it appears highly probable that these Cicadas belong to this 13-year brood XVIII rather than to the 17-year brood VIII.

At any rate the entomologists and their correspondents—no matter whether or not these understand anything of entomology—could do very much this year to more fully ascertain the extent of this brood and to clear up the doubtful points concerning the same, by looking out for, and recording all reports on the appearance of Cicadas or "Locusts" as they are popularly termed. The knowledge of the various broods of the Periodical *Cicada* is now sufficiently advanced to enable us to eliminate all untrustworthy reports resulting from a confusion of the Cicadas with the true "Locusts" (Grasshoppers) or with the various other non-periodical species of *Cicada*.

J. B. S.

Society News.

Brooklyn Entomological Society.—APRIL 2nd, 1889. Twenty persons present, President Casey in the chair. Reports were presented by the treasurer, the librarian and the curators, which were duly accepted. The resignation of Messrs. Hulst and Roberts, editors of ENTOMOLOGICA AMERICANA, having been tendered and regretfully accepted by the Society, Messrs. Smith and Chittenden were elected to fill the vacancies.

Mr. Weeks read a paper on "Utilization of Entomological Experience," showing the value of apparently unimportant notes in completing the life histories of insects. In the discussion which followed Messrs. Hulst and Smith took part.

MAY 7th, 1889.—Twenty persons present. The president in the chair. Reports of officers were presented and accepted, and considerable routine matter was discussed and disposed of. Messrs. A. C. Bradley and J. G. Maloneé, both of Brooklyn and members of the Brooklyn Institute were elected to membership in the Entomological Department.

Mr. Smith read a communication from the Netherland Entomological Society, embracing a report of a committee on a proposed code of nomenclature, and requesting consideration of the matter. Messrs. Casey, Smith and Hulst were thereupon appointed a committee for that purpose.

Mr. Hulst read a paper on "*Cerathosia tricolor*, Smith," and exhibited microscopic slides of the larvæ. Messrs. Smith and Weeks joined in the discussion which followed.

Mr. Smith then presented the subject "Scent Organs of the Lepidoptera," with black-board illustrations. The subject was discussed by Messrs. Hulst, Weeks and Beutenmüller.

A. C. WEEKS, *Rec. Sec'y.*

Notes and News.

IT is intended to prepare for publication a "List of the Insects of New Jersey." Will those of our readers who have collected in this State please make lists of their captures and forward them to the editor with such notes as they may add. They will be duly acknowledged and made use of.

* * *

IN our next number we hope to publish a second supplement to Henshaw's List of Coleoptera, together with a list of synopses and monographic works which have appeared since the publication in 1883 of Leconte and Horn's Classification. A few extra copies will be printed and be furnished at 25 cents per copy. All desiring such will please notify the editor at once.

* * *

A few copies of the Monograph of the N. A. Sphingidæ can be obtained from the editor at $2.00 per copy. There are also two complete sets of the Bulletin Brooklyn Ent. Soc. at $8.00 per set, of 7 volumes.

ENTOMOLOGICA AMERICANA

VOL. V. BROOKLYN, JULY, 1889. NO. 7.

A GENERIC SYNOPSIS OF THE BYTHOSCOPIDÆ.

By Wm. H. Ashmead.

Family V. BYTHOSCOPIDÆ.

Head as wide or wider than the thorax, when narrower very thin antero-posteriorly with a sharp superior margin; the frons in the former case obtuse or slightly convex, in the latter, flattened. Ocelli 2, situated on the frons between the antennæ. Antennæ setiform, 3-jointed, the basal joints short, thick, placed in cavities. Thorax well developed, wider than long, or else hexagonal, slightly convexly rounded, punctate, or with delicate striations. Scutellum rather large, triangular. Elytra subopaque, seldom entirely translucent. Tegulæ present. Posterior coxæ contiguous. Tibiæ prismatic, the hind edges of posterior pair most frequently armed with a double row of numerous strong spines or else with small denticulations or fine ciliæ. Tarsi 3-jointed.

This family is of rather small extent and represented by but comparatively few genera; in it I have included, as subfamilies, the genera *Æthalion* Latreille, and *Eurymela* Burmeister, the position of which has been the subject of considerable controversy with systematists.

The former, seems to be closely allied to the *Membracidæ* where Stäl placed it; the latter, to the *Jassidæ*, but their general facies and the position of the ocelli are Bythoscopid, and I believe they belong in this group.

The following table will enable one to recognize these subfamilies:

SUBFAMILIES.

Head transverse, antero-posteriorly very thin, much narrower than the thorax; frons flat, upper margin sharp; thorax hexagonal, the sides usually sinuate. . . . .

Subfamily I. ÆTHALIONINÆ.

Head broadly transverse, antero-posteriorly rarely very thin, as broad or broader than the thorax; frons usually convex, upper margin rounded; thorax transverse quadrate or somewhat trapezoidal, sides not sinuate.

*Posterior tibiæ usually not strongly spined, at the most with two or three spines, or else with a double row of weak spines or ciliæ ....
SUBFAMILY II. **EURYMELINÆ.**

**Posterior tibiæ always with a double row of strong spines ....
SUBFAMILY III. **BYTHOSCOPINÆ.**

SUBFAMILY I. ÆTHALIONINÆ.

TABLE OF GENERA.

Head deeply emarginated .... G. 1. **Schizia** Spinola
Head not or but slightly emarginated.

Costal area with 3 to 5 transverse veins, none forked...G. 2. **Æthalion** Latreille

Costal area with 9 transverse veins, the 2nd forked; outer edge of posterior tibiæ with numerous small denticulations.....G. 3. **Polydontoscelis** n. g.*

SUBFAMILY II. EURYMELINÆ.

TABLE OF GENERA.

Posterior tibiæ with not more than 2 or 3 spines..... G. 1. **Eurymela** Burm.
Posterior tibiæ with a double row of very weak spines ....
G. 2. **Eurymeloides** n. g.

SUBFAMILY III. BYTHOSCOPINÆ.

TABLE OF GENERA.

Antennæ inserted in feeble cavities..... 2

Antennæ inserted in deep cavities beneath a ledge.

Thorax with transverse striations.

Lateral margins of thorax sharply keeled, of moderate length.....
G. 1. **Macropsis** Lewis

Lateral margins of thorax not sharply keeled, very short.....
G. 2. **Bythoscopus** Germ.

Thorax with oblique striations.....G. 3. **Pediopsis** Germ.

2 Head including the eyes wider than the elytra at base.

Membrane with an appendage .....G. 4. **Idiocerus** Lewis

Membrane without an appendage .....G. 5. **Pachyopsis** Uhler

Head including the eyes not wider than the elytra at base.

Membrane without an appendage.....G. 6. **Agallia** Curtis

* A new genus discovered in Florida.

SECOND SUPPLEMENT TO THE LIST OF COLEOPTERA OF AMERICA, NORTH OF MEXICO.*

By Samuel Henshaw.

I have endeavored to record here the new species of Coleoptera, found in America, north of Mexico, which have been described from 1887 to the date of writing, May 1889. A few names omitted from previous lists are also included.

The bibliography of recently published monographs and synopses renders it unnecessary to note the changes in synonymy and the danger of mistakes arising from the use of numbers is thus avoided.

LIST OF SPECIES.

CARABIDÆ.

Anillus.
9452. explanatus Horn.

Pterostichus.
9453. johnsoni Ulke.

SCYDMÆNIDÆ.

Cephennium.
9454. breve Schauff.

PSELAPHIDÆ.

Chennium.
Biotus Casey.
9455. formicarius Casey.

Tyrus.
Pytna Casey.
9456. corticina Casey.

Tychus.
9457. sonomæ Casey.
9458. bipuncticeps Casey.

Decarthron.
9459. brendeli Casey.

Nisaxis Casey.
9460. cincinnata Casey.
9461. maritima Casey.

Bryaxis.
9462. canadensis Brend.
9463. arizonæ Casey.

Anchylarthron Brend.
Verticinotus Brend.

Batrisus.
9464. cephalotes Casey.
9465. luculentus Casey.
9466. foveicornis Casey.
9467. punctifrons Casey.
9468. spinifer Brend.

Actium Casey.
9469. pallidum Casey.
9470. politum Casey.
9471. robustulum Casey.
9472. testaceum Casey.

Conoplectus Brend.

Eurhexius Sharp.
Rhexidius Casey.
9473. granulosus Casey.

* For the First Supplement see Ent. Amer., 1887, Vol. 2, pp. 213—220.

Trogaster Sharp.

Oropus Casey.

9474. montanus Casey.

Euplectus.

9475. californicus Casey.

Faronus.

Sonoma Casey.

9476. corticina Casey.

9477. cavifrons Casey.

STAPHYLINIDÆ.

Gymnusa.

9478. variegata Kiesw.

Quedius.

9479. erythrogaster Mann.

Trogophlœus.

9480. anthracinus Casey.

9481. corvinus Casey.

9482. dentiger Casey.

9483. mexicanus Casey.

9484. texanus Casey.

9485. armatus Casey.

9486. gilæ Casey.

9487. prominens Casey.

9488. pacificus Casey.

9489. arizonæ Casey.

9490. occiduus Casey.

9491. conjunctus Casey.

9492. spretus Casey.

9493, apacheanus Casey.

9494. mancus Casey.

9495. spectatus Casey.

9496. imbellis Casey.

9497. lepidus Casey.

9498. diffusus Casey.

9499. lapsus Casey.

9500. egregius Casey.

9501. obliquus Casey.

9502. sculptilis Casey.

9503. difficilis Casey.

9504. congener Casey.

9505. agonus Casey.

9506. temporalis Casey.

9507. probus Casey.

9508. nanulus Casey.

9509. modestus Casey.

9510. pertenuis Casey.

9511. detractus Casey.

9512. indigens Casey.

9513. graphicus Casey.

9514. ingens Casey.

9515. incertus Casey.

9516. delicatus Casey.

9517. pudicus Casey.

9518. robustulus Casey.

9519. confinis Casey.

9520. pauperculus Casey.

9521. languidus Casey.

9522. bipuncticollis Casey.

9523. pallidulus Casey.

9524. debilis Casey.

9525. fallax Casey.

9526. providus Casey.

9527. inquisitus Casey.

9528. facetus Casey.

9529. confusus Casey.

9530. scrupulus Casey.

9531. insolitus Casey.

9532. filum Casey.

9533. decoloratus Casey.

9534. tantillus Casey.

Apocellus.

9535. cognatus Sharp.

SCAPHIDIIDÆ.

Scaphidium.

9536. antennatum Reitt.

Cyparium.

9537. substriatum Reitt.

Scaphisoma.

9538. impunctatum Reitt.

9539. læve Reitt.

CRYPTOPHAGIDÆ.

Cœnoscelis.

9540. cryptophaga Reitt.

DERMESTIDÆ.

Orphilus.

9541. ater Er.

NITIDULIDÆ.

Soronia.

9542. schwarzii Ulke.

HETEROCERIDÆ.

Heterocerus.

9543. americanus Sharp.
9544. vilis Sharp.

ELATERIDÆ.

Cardiophorus.

9545. bifasciatus Blanch.
9546. coxalis Blanch.
9547. pullus Blanch.
9548. gemnifer Blanch.
9549. abbreviatus Blanch.
9550. angustatus Blanch.
9551. nevadensis Blanch.
9552. crinitus Blanch.
9553. pubescens Blanch.
9554. carbonatus Blanch.
9555. seniculus Blanch.
9556. dispar Blanch.

BUPRESTIDÆ.

Chrysobothris.

9557. costifrons Waterh.

MALACHIDÆ.

Listrus.

9558. punctatus Mots.

Dasytes.

9559. catalinæ Lec.

CIOIDÆ.

Cis.

9560. tetracentrum Gorh.

SCARABÆIDÆ.

Ægialia.

9561. rufescens Horn.
rufa || Lec.
9562. blanchardi Horn.
9563. pusillus Horn.
9564. opifex Horn.

Psammodius.

9565. nanus DeGeer.
9566. hydropicus Horn.

Pleurophorus.

9567. ventralis Horn.

Atænius.

9568. californicus Horn.
9569. cognatus Lec.
9570. strigatus Say.
9571. inquisitus Horn.
9572. wenzelii Horn.
9573. læviventris Horn.
9574. inops Horn.
9575. texanus Har.
9576. lecontei Har.
9577. insculptus Horn.

Aphodius.

9578. ovipennis Horn.
9579. tenuistriatus Horn.
9580. acerbus Horn.
9581. nanus Horn.
9582. depressus Kug.
9583. rufipes Linn.
9584. pumilus Horn.

9585. inutilis Horn.
9586. luxatus Horn.
9587. parcus Horn.
9588. larreæ Horn.
9589. luteolus Horn.
9590. æmulus Horn.
9591. haldemani Horn.
politus || Horn.
9592. decipiens Horn.
9593. gentilis Horn.
9594. consociatus Horn.
9595. conspersus Horn.

Geotrupes.

9596. ulkei Blanch.
9597. hornii Blanch.

Pleocoma.

9598. rickseckeri Horn.
9599. conjungens Horn.
9600. ulkei Horn.
9601. puncticollis Rivers.

Lachnosterna.

9602. hamata Horn.
9603. generosa Horn.
9604. prætermissa Horn.
9605. clemens Horn.
9606. hirtiventris Horn.
9607. postrema Horn.
9608. inversa Horn.
9609. bipartita Horn.
9610. vehemens Horn.
9611. grandis Smith.
9612. dubia Smith.
9613. arcuata Smith.
9614. insperata Smith.
9615. ulkei Smith.
9616. quadrata Smith.
9617. politula Horn.
9618. barda Horn.
9619. spreta Horn.
9620. nova Smith.
9621. infidelis Horn.
9622. luctuosa Horn.
9623. profunda Blanch.
9624. scitula Horn.
9625. hornii Smith.
9626. biimpressa Smith.
9627. longispina Smith.
9628. implicita Horn.
9629. innominata Smith.
9630. limula Horn.
9631. delata Horn.
9632. æmula Horn.
9633. arcta Horn.
9634. vetula Horn.
9635. fucata Horn.
9636. exorata Horn.
9637. ignava Horn.
9638. inepta Horn.
9639. affabilis Horn.
9640. clypeata Horn.
integra || Lec.
9641. boops Horn.
9642. ecostata Horn.
9643. antennata Smith.
9644. lenis Horn.
9645. heterodoxa Horn.
9646. tusa Horn.

Aphonides Rivers.

Anoplognatho || Rivers.
9647. dunniana Rivers.

Stephanucha Burm.

9648. pilipennis Kraatz.

CERAMBYCIDÆ.

Mecas.

9649. saturnina Lec.

CHRYSOMELIDÆ.

Longitarsus.

9650. nitidellus Cockr.

LAGRIIDÆ.

Statira.

9651. pluripunctata Horn.
9652. opacicollis Horn.
9653. basalis Horn.

MELANDRYIDÆ.

Mallodrya Horn.
9654. subænea Horn.
Hypulus.
9655. bicinctus Horn.
Eustrophus.
9656. arizonensis Horn.
9657. repandus Horn.
Holostrophus Horn.
9658. discolor Horn.
Orchesia.
9659. ornata Horn.

PYTHIDÆ.

Trimitomerus Horn.
9660. riversii Horn.

PYROCHROIDÆ.

Pyrochroa.
9661. fascicollis Mann.

RHYNCHITIDÆ.

Auletes.
9662. laticollis Casey.

OTIORHYNCHIDÆ.

Epicærus.
9663. texanus Casey.
9664. sulcatus Casey.
Stamoderes.
9665. uniformis Casey.
Ophryastes.
9666. shufeldti Casey.
9667. sulcipennis Casey.
Eupagoderes.
9668. dunnianus Casey.
Sapotes Casey.
9669. puncticollis Casey.
Rhigopsis.
9670. scutellata Casey.
Amotus Casey.
9671. longisternus Casey.
9672. gracilior Casey.
Peritaxia.
9673. perforata Casey.
Exomias.
9674. pellucidus Boh.
Amnesia.
9675. granulata Casey.
9676. tesselata Casey.
9677. sculptilis Casey.
Nocheles.
9678. vestitus Casey.
Miloderes.
9679. setosus Casey.
Sciopithes.
9680. significans Casey.
9681. brumalis Casey.
9682. arcuatus Casey.
9683. angustulus Casey.
9684. setosus Casey.
Stenoptochus Casey.
9685. inconstans Casey.
Orthoptochus Casey.
9686. squmiger Casey.
Peritelodes Casey.
9687. obtectus Casey.
Peritelinus Casey.
9688. variegatus Casey.
Geoderces.
9689. puncticollis Casey.
Geodercodes Casey.
9690. latipennis Casey.
Aragnomus.
9691. hispidulus Casey.
Thinoxenus.
9692. nevadensis Casey.
Panormus Casey.
9693. setosus Casey.

Elissa Casey.
9694. laticeps Casey.
9695. constricta Casey.

Pseudelissa Casey.
9696. cinerea Casey.

Scythropus.
9697. lateralis Casey.
9698. ferrugineus Casey.
9699. cinereus Casey.
9700. crassicornis Casey.

CURCULIONIDÆ.

Sitones.
9701. extrusus Casey.
9702. varians Casey.
9703. margaritosus Casey.
9704. procerus Casey.
9705. occidentalis Casey.
9706. eximius Casey.
9707. montanus Casey.
9708. nebulosus Casey.
9709. alternans Casey.
9710. osculans Casey.
9711. prominens Casey.
9712. hispidiceps Casey.
9713. angustulus Casey.
9714. explicitus Casey.
9715. apacheanus Casey.
9716. sparsus Casey.

Apion.
9717. lividum Smith.

Sciaphilus Sch.
9718. muricatus Fabr.

Strophosomus Billb.
9719. coryli Fabr.

Macrops.
9720. indistinctus Dietz.
9721. cryptops Dietz.
9722. hyperodes Dietz.
9723. nevadensis Dietz.
9724. grypidioides Dietz.
9725. wickhami Dietz.
9726. interpunctatulus Dietz.
9727. ulkei Dietz.
9728. dorsalis Dietz.
9729. tenebrosus Dietz.
9730. alternatus Dietz.
9731. montanus Dietz.
9732. interstitialis Dietz.
9733. hornii Dietz.
9734. setiger Dietz.
9735. subcribratus Dietz.
9736. longulus Dietz.
9737. rotundicollis Dietz.
9738. obscurellus Dietz.
9739. imbellis Dietz.
9740. hirtellus Dietz.
9741. echinatus Dietz.
9742. obtectus Dietz.
9743. myasellus Dietz.
9744. mirabilis Dietz.
9745. californicus Dietz.
9746. anthracinus Dietz.

Otidocephalus.
9747. pœyi Gyll.

Cryptorhynchus.
9748. lapathi Linn.

Ceutorhynchus.
9749. cyanipennis Ill.

CALANDRIDÆ.

Phlœophagus.
9750. spadix Hbst.

SCOLYTIDÆ.

Pityophthorus.
9751. concentralis Eich.
9752. manzanita Sz.

Trypodendron Steph.
9753. vittigerum Eich.

Thysanœs.
9754. ficus Sz.

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CARABIDÆ.

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Anophthalmus. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 270—271.

Calathus. *Synoptic table.* Leconte, Bull. Br. Ent. Soc., 1883, v. 6. p. 49.

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Agonoderus. *Synoptic table.* Leconte, Bull. Br. Ent. Soc., 1883, v. 6, p. 53—54.

Discoderus. *Synoptic table.* Horn, Bull. Br. Ent. Soc., 1883, v. 6, p. 52—53.

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Tachycellus. *Synoptic table.* Horn, Bull. Br. Ent. Soc., 1883, v. 6, p. 51—52.

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HYDROPHILIDÆ.

Note. Horn, Ca. Ent., 1885, v. 17, p. 137—139.

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* Incomplete.

SCYDMÆNIDÆ.

Eumicrus. *Synoptic table.* Casey, Cont. Col., 1884, pt. 2, p. 87.

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New species. Casey, Bull. Cal. Acad. Sci., 1887, v. 2, p. 455—482, plate.
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STAPHYLINIDÆ.

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TRICHOPTERYGIDÆ.

Synopsis. Matthews, Trans. Amer. Ent. Soc., 1884, v. 11, p. 113—156.

COLYDIIDÆ.

Lasconotus. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 141—142.

CUCUJIDÆ.

Revision. Casey, Trans. Amer. Ent. Soc., 1884, v. 11, p. 69—112, plates.

ELATERIDÆ.

Melasis. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1886, v. 13, p. 6—8.

Tharops. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1886, v. 13, p. 8—9.

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Eniconyx. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1884, v. 12, p. 51—52.

Perothops. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1886, v. 13, p. 53—54.

Cerophytum. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1886, v. 13, p. 50—52.

THROSCIDÆ.

Synopsis. Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 198—208.

BUPRESTIDÆ.

Gyascutus. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 287.

Hippomelas. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 288.

Anthaxia. *Notes.* Casey, Cont. Col., 1884, pt. 2, p. 172—175.

Chrysobothris. *Monograph.* Horn, Trans. Amer. Ent. Soc., 1886, v. 13, p. 65—124, plates.

Thrincopyge. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 147.

LAMPYRIDÆ.

Zarhipis. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 148.

LUCANIDÆ.

Platycerus. *Synoptic table.* Casey, Bull. Cal. Acad. Sci., 1885, v. 1, p. 332.

SCARABÆIDÆ.

Canthon. *Synopsis.* Blanchard, Trans. Am. Ent. Soc., 1885, v. 12, p. 163—167.

Chœridium. *Characters.* Blanchard, Trans. Am. Ent. Soc., 1885, v. 12, p. 170.

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Ægialia. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1887, v. 14, p. 98—105.

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Pleurophorus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1887, v. 14, p. 90—92.

Rhyssemus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1887, v. 14, p. 87—90.

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Phytalus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 119—123.

Anomala. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1884, v. 11, p. 157—164.

Orizabus. *Descriptions.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 124—126.

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CERAMBYCIDÆ.

Synonymical notes. Gahan, Trans. Amer. Ent. Soc., 1888, v. 14, p. 299—300.

Mallodon. *Synoptic table.* Horn, Bull. Br. Ent. Soc., 1884, v. 7, p. 9—10.

Derobrachus. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 11.

Prionus. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 57—59.

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Asemum. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 62—63.

Criocephalus. *Synoptic table,* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 63—64.

Tetropium. *Characters.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 95—96.

Physocnemum. *Characters.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 97.

Hylotrupes. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 98.

Phymatodes. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 98—101.

Callidium. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1884, v. 7, p. 112—113.

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Achryson. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1885, v. 7, p. 117.

Gracilia. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1885, v. 7, p. 118.

Brothylus. *Synoptic table.* Leng, Bull. Br. Ent. Soc., 1885, v. 7, p. 119.

Eburia. *Synoptic table.* Leng, Ent. Amer., 1885, v. 1, p. 28—29.

Romaleum. *Synoptic table.* Leng, Ent. Amer., 1885, v. 1, p. 29—31.
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* Incomplete.

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Aneflus. *Synoptic table.* Leng, Ent. Amer., 1885, v. 1, p. 34—35; Horn, ibid., p. 131 133.

Compsa. *Synoptic table.* Leng, Ent. Amer., 1885, v. 1, p. 134—135.

Heterachthes. *Synoptic table.* Leng, Ent. Amer., 1885, v. 1, p. 135.

Phyton. *Characters.* Leng, Ent. Amer., 1886, v. 2, p. 28.

Obrium. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 28.

Hybodera. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 28—29.

Callimus. *Characters.* Leng, Ent. Amer., 1886, v. 2, p. 29.

Molorchus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 30.

Callimoxys. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 29—30.

Rhopalophora. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 30—31.

Elytroleptus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 31—32.

Callichroma. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 61.

Stenaspis. *Characters.* Leng, Ent. Amer., 1886, v. 2, p. 62.

Crioprosopus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 62.

Tragidion. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 81.

Purpuricenus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 81—82.

Metaleptus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 82.

Æthecerus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 82.

Amannus. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 83.

Batyle. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 102.

Oxoplus. *Synoptic table.* Horn, Trans. Am. Ent Soc., 1885, v. 12, p. 175—176; Leng, Ent. Amer., 1886, v. 2, p. 102—103.

Tylosis. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 118.

Crossidius. *Synoptic table.* Leng, Ent. Amer., 1886, v. 2, p. 118—119.

Stenosphenus. *Synopsis.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 177—180. *Synoptic table.* Leng, Ent. Amer., 1887, v. 2, p. 193—194.

Cyllene. *Synoptic table.* Leng, Ent. Amer., 1887, v. 2, p. 195—197.

Calloides. *Synoptic table.* Leng, Ent. Amer., 1887, v. 2, p. 197.

Clytus. *Synoptic table.* Leng, Ent. Amer., 1887, v. 2, p. 198.

Xylotrechus. *Synopsis.* Leng, Ent. Amer., 1887, v. 2, p. 198—200; v. 3, p. 4.

Neoclytus. *Synopsis.* Leng, Ent. Amer., 1887, v. 3, p. 4—8.

Clytanthus. *Characters.* Leng, Ent. Amer., 1887, v. 3, p. 23.

Euderces. *Synopsis.* Leng, Ent. Amer., 1887, v. 3, p. 24; 44.

Monilema. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 180—190.

Monohammus. *Synopsis.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 190—193.

Dorcaschema. *Synoptic table.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 194.

Goes. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 193.

Eupogonius. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 196.

Oncideres. *Synoptic table.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 194—195.

Dysphaga. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 197.

CHRYSOMELIDÆ.

Chrysochus. *Synoptic table.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 156.
Graphops (Scelodonta). *Synoptic table.* Leconte, Trans. Amer. Ent. Soc., 1884, v. 12, p. 26—27.
Haltıcinæ. *Notes.* Jacoby, Trans. Amer. Ent. Soc., 1888, v. 14, p. 302–303; Horn, ibid., p. 303–304.
Microrhopala. *Synopsis.* Horn, Trans. Am. Ent. Soc., 1883, v. 10, p. 290–294.
Odontota. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 294–298.
Charistena. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 298—299.
Octotoma. *Descriptions.* Horn, Trans. Am. Ent. Soc., 1883, v. 10, p. 299—300.
Stenispa. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 301–302.

BRUCHIDÆ.

Zabrotes. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1885, v. 12, p. 156—159.

TENEBRIONIDÆ.

Eusattus. *Synoptic table.* Horn, Trans. Am. Ent. Soc., 1883, v. 10, p. 304—305.

LAGRIIDÆ.

Synopsis. Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 28–32.

MELANDRYIDÆ.

Hypulus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 39—42.
Eustrophus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 32—35.
Holostrophus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 36—37.
Orchesia. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 37–38.

PYTHIDÆ.

Pytho. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 45—46.

ANTHICIDÆ.

Corphyra. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 305—310.
Notoxus. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 165—174.
Mecynotarsus. *Synopsis.* Horn, Trans. Am. Ent. Soc., 1884, v. 11, p. 175—176.

PYROCHROIDÆ.

Dendroides. *Synopsis.* Horn, Trans. Amer. Ent. Soc., 1888, v. 15, p. 46—48.

MELOIDÆ.

Macrobasis. *Synoptic table.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 109—110.
Tetraonyx. *Synoptic table.* Horn, Trans. Am. Ent. Soc., 1885, v. 12, p. 116.
Pyrota. *Descriptions.* Horn, Trans. Amer. Ent. Soc., 1885. v. 12, p. 112—115.
Cantharis. *Synoptic table.** Horn, Trans. Amer. Ent. Soc., 1883, v. 10, p. 311.

OTIORHYNCHIDÆ.

Epicærus. *Synoptic table.* Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 234.
Amotus. *Synoptic table.* Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 244.
Amnesia. *Synoptic table.** Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 247.
Sciopithes. *Synoptic table.** Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 254.
Elissa. *Synoptic table.* Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 272.
Scythropus. *Synoptic table.** Casey, Ann. N. Y. Acad. Sci., 1888, v. 4, p. 275.

CURCULIONIDÆ.

Apioninæ. *Synopsis.* Smith, Trans. Am. Ent. Soc., 1884, v. 11, p. 41—68, plate.
Balaninus. *Synoptic table.* Blanchard, Bull. Br. Ent. Soc., 1884, v. 8, p, 106—108.

SCOLYTIDÆ.

Notes. Schwarz, Ent. Amer., 1886, v. 2, p. 40—42; 54—56.

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* Incomplete.

Note on Fornax calceatus *Say*, and F. Hornii *Bonv.*, and on Corymbites divaricatus *Lec.*, and C. crassus *Lec.*

By Frederick Blanchard.

Mr. Chas. Dury has mentioned in Ent. Amer., vol. IV, p. 163, that *Fornax Hornii* is the ♀ of *calceatus*. I had not identified the former, but on exhibiting to Dr. Horn a series of *calceatus*, assorted according to sex, he at once remarked that the ♀ was what is described as *Hornii*. The antennæ are slender and filiform, in the ♂ reaching three joints beyond the hind angles of the thorax and as far as the hind coxæ, but in the ♀ only extending one joint behind the thoracic angles; the second joint is inserted beneath the apex of the first so as to be partly hidden from above, when observed from below, however, in the ♂, the second, third and fourth joints appear to be about equal in length, or the third may be a trifle longer; in the ♀, the third joint is quite distinctly longer than the second or fourth, and on this difference chiefly, is based the name *Hornii*; the second joint is not really shorter than in the ♂, but it looks shorter in comparison with the greater length of the third.

I observe that in this species and also in three species of *Dromæolus*, *basalis*, *cylindricollis* and *striatus*, which are before me, all having filiform antennæ, that the thighs are rather deeply grooved and broad at the apex, the lower angle being laminiform and partly protecting the tibiæ in repose. In *Dromæolus pusillus*, having serrate antennæ, the thighs though grooved beneath for the reception of the tibiæ are narrowed at tip without distinct expansion of the angle. In *Fornax calceatus* the claws are also simple as in *Dromæolus*; the coxal plates are strongly dilated inwardly and usually strongly angulate, but specimens occur with the posterior inner angle considerable rounded. The ♂ has the thorax more narrowed in front; the lateral pieces of the ♂ intromittent organ have a hook-like barb at tip.

The larger female greatly exceeds the male in size, the ♂ being 4.5—5 mm., and the ♀ 5—7 mm.

The species occurs rather abundantly in Mass. and N. Y., under bark of pine stumps in May.

The only other species of *Fornax* at hand as I write is *orchesides*, which has toothed claws, the antennæ are strongly serrate and do not differ appreciably in the sexes, the second joint is here really very short while the third is longer than the fourth and equally broad. The eyes encroach more upon the antennal grooves than in *calceatus*, in fact completely occupying them. The thighs are grooved beneath, but narrowed

at tip and not distinctly laminate. The ♂ organ has the barbs of the corneous lateral valves very remote from the tips.

From the foregoing it would seem that *F. calceatus* is more nearly allied to certain *Dromæolus* than to *F. orchesides.*

Corymbites divaricatus Lec.—On comparing notes with Mr. Ulke it was observed that the ♀ of this species is the *crassus* of Leconte. Although placed in different sections of the genus the suggestion of their identity once made, the conclusion is inevitable. The ♂ antennæ are serrate and longer than the head and thorax, the second joint is shorter and thicker than the third, the third is a little shorter than the fourth, gradually thicker towards the tip, but not broad like the fourth and following joints. The thorax of the ♂ is much narrower than the elytra, the sides straight or nearly so, gradually diverging from apex nearly to the base, thence the angles are produced and very strongly diverging. The elytral striæ are about as wide as the intervals and with close, deeply impressed, quadrate punctures. In the male the body is much inflated, generally darker in color, piceous above and beneath and more shining. The thorax is very convex and as wide as the base of the elytra, and the angles but feebly diverging. The antennæ are about two-thirds as long as in the ♂, very feebly serrate, the fourth and following joints much shortened and hence the third joint is quite as long as the fourth, but narrower. The tarsi, especially the anterior ones, are shorter in the ♂.

To Whom it May Concern.

EDITOR ENTOMOLOGICA AMERICANA:

In a recent issue you mention that Prof. Fernald contemplates a visit to Europe the present Summer in order to examine types, and by way of comment object to the wholesale American type-making over there. Your views startle me! I have somehow received the impression that "Gattung- und Arten-macherei" was the highest ambition of the entomologist, and to rob our transatlantic confreres of that sweet satisfaction would be cruel. And beside, what have types to do with the matter; they would only the sooner consign the myriads of mihis to the maelstrom of synonyms.

In the recent transactions of the French Entomological Society there are "diagnoses" of eighty-six "new" species of Diptera, nearly all North American *Tachinidæ* and *Dexidæ.* They average about sixty words to the "description," and some of them do not exceed fifteen. Now, while it may be true that the species of these families are easily

recognizable from descriptions, so much so that hardly any one ever takes the troubte to determine them at all, yet I would very respectfully submit that a few words more, or at least some vague intimation that other species of the family had been previously described, might throw some light upon their synonymy. Palæontologists may properly erect a new species on a fossil foot, but when the entomologist attempts the same with a fly's foot, or other *membra disjecta*, one can only ask that the author give, at least, a good description of the claws.

It is probable that the above mentioned Latin diagnoses will be followed sometime in the future by French translations, and the author will then add eighty-three more mihis to his already plethoric list of North American "species." Mr. Léveillé, at a recent séance of the Society, proposed that it should form a collection of types, especially of the insects described in the Annales. I can assure him that a collection of such types as the above mentioned flies will be in great demand—for the determination of synonyms, or for purposes of description. The *Tachinidæ* are such an attractive family of insects that it shows much prudence in publishing diagnoses, and thus saving the mihis. The half dozen active dipterologists of the world are probably all looking with envious eyes at the author's good-fortune.

But the subject takes one's breath away; it can only be characterized by a very big O ! !

New Haven, May 25, 1889. S. W. Williston.

NOTE BY EDITOR.

Dr. Williston speaks feelingly and we sympathize with him. We have been in precisely the same frame of mind, and can testify that nothing is so certain to make a man unutterably weary and to force him to the conviction that after all marriage is a failure, as the receipt of a paper containing a lot of "new species," just about the time when one begins to feel that light is ahead and the weary work of making the acquaintance of adamized species at an end. If a paper be really good, this feeling does not exist. We refer only to the variety (it may be a species) which seems to have aroused Dr. Williston's ire, where you can read the "diagnoses" forward, backward and from the middle, without being at all clear whether after all the characters given apply to twenty, or only to fifteen species. The matter ought really to be brought to the attention of the Society for the Suppression of Vice, or some similar society, for I am quite certain that a more vicious condition of mind could not possibly be aroused even by an undraped cigarette picture than by such a publication as mentioned by Dr. Williston!

NOTES ON HETEROCERUS.

By Geo. H. Horn, M. D.

While attempting to bring order in an overcrowded box in my cabinet, the specimens of *Heterocerus* had to be removed and their replacement elsewhere has cost me some little trouble in an attempt to assort the specimens specifically. While I have not yet been able to satisfy myself as to the validity of some of Kiesenwetter's species, certain points of some interest have been developed.

H. pusillus Say, *limbatus* Kies., *luteolus* Lec. This species is remarkable in that the ♂ has at the base of the mandibles a lobe which overlaps the labrum, nearly meeting. This is our smallest species and is very widely distributed. Dr. Hamilton takes it at Allegheny, Pa., and I have it from Kansas, Texas, Arizona, Southern California and Mexico.

H. pallidus Say. This is the large pale species taken rather abundantly by Prof. Snow in Kansas and N. Mex., extending also to Arizona and Texas.

Three species have been observed in which the labrum, ♂, is more or less produced at middle—*labratus*, *ventralis* and *pallidus*.

It is my hope to make it possible to determine our species, but the difficulty of obtaining specimens from the region east of the Mississippi is a great draw-back. No one seems to have collected them, and one or two specimens by themselves are of little use.

From the western regions (Cal., Ariz., Tex.,) there is an abundance of material. If those who can collect them will take as many as possible and thereby assist in the work I have in hand, all will be benefited.

Book Notices.

Bulletin No. 1, of the Office of Experiment Stations, U. S. Department of Agriculture is at hand, and contains the organization of the various stations and matter of interest necessarily to entomologists. In a late number of Entomologica Americana there was published a list of the entomologists of the experiment stations which is rather incomplete and not quite accurate. The receipt of this bulletin makes a more complete list possible.

Arkansas—C. W. Woodworth, B. S., ... Little Rock, Arkansas.
*California—F. W. Morse, ... Berkeley, Cal.
Connecticut—Has no entomologist, but Dr. Roland Thaxter, the mycologist, is well known as a good Lepidopterist, and prob-

ably does what is necessary. The station is at New Haven, Conn.

Dakota—J. H. Orcutt, M. D., Ph. D., ... Brookings, Dak.
Delaware—M. H. Beckwith, ... Newark, Del.
Florida —Jos. N. Neal, ... Lake City, Fla.
Georgia—J. P. Campbell, Ph. D., ... Athens, Ga.
Illinois—Has no entomologist on the station staff, but Prof. S. A. Forbes, Champaign, Ill., is state entomologist, and Dr. Selim Peabody, director of the Station at Champaign, is an entomologist of excellent standing.
Indiana—F. M. Webster, ... Lafayette, Ind.
Iowa—C. P. Gillette, M. Sc., ... Ames, Iowa.
Kansas—Edwin A. Popenoe, A. M., ... Manhattan, Kans.
Maine—F. M. Harvey, M. Sc., ... Orono Maine.
Massachusetts—Chas. H. Fernald, Ph. D., ... Amherst, Mass.
Michigan—A. J. Cook, M. Sc., ... Agricultural College, Mich.
Arthur B. Cordley, B. S., } Ass't's " " "
Charles B. Cook, B. S., }
Minnesota—Otto Lugger, Ph. D., ... St. Anthony Park, Minn.
*Mississippi—S. M. Tracey, ... Agricultural College, Miss.
Missouri—J. W. Clark, B. S., ... Columbia, Mo.
Nebraska—Lawrence Bruner, ... Lincoln, Nebr.
New Jersey—John B. Smith, ... New Brunswick, N. J.
New York—J. H. Comstock, B. S., ... Ithaca, N. Y.
Prof. J. A. Lintner, State entomologist, .. Albany, N. Y.
Ohio—Clarence M. Weed, B. Sc., ... Columbus, Ohio.
South Carolina—G. F. Atkinson, Ph. B., ... Columbia, S. C.
*Texas—M. Francis, ... College Station, Tex.
Tennessee—Henry E. Summers, B. S., ... Knoxville, Tenn.
Vermont—G. H. Perkins, Ph. D., ... Burlington, Vt.
Virginia—William B. Alwood, ... Blacksburg, Va.

* From a list published in April number of Psyche.

We should be pleased to be kept informed of additions to or changes in this list, and should be pleased also if these gentlemen would send their publications to the Brooklyn Entomological Society so that their works may become known to our members. J. B. S.

* * *

Injurious and other Insects of the State of New York, by J. A. LINTNER, Ph. D., State Entomologist.

We have received from the author the *Fourth Annual Report.* The preceding reports were among the best of their kind published in this country, and have placed Dr. Lintner among the highest as a careful and reliable observer. The present report is a worthy companion to those that have preceded it. It is most excellent in the value of its information, and the methods in which that information is presented. Some thirty species are treated of quite at length, and many brief notes are given. The author, page 44, describes as new, *Aulacomerus lutescens*, and gives drawings of larva and imago. G. D. H.

Society News.

At the June (10th,) meeting of the American Entomological Society, Dr. Horn stated that a professional sister had brought him some small beetles which a patient of hers declares issue from little pustules on her body, each in a little lump of pus. The beetles are *Lathridiids* and Dr. Horn declared it an utter impossibility not only that they should have developed in the closed pustules but that the beetle could sustain life in them. It is a case of voluntary or involuntary deception of the physician by the patient, such as one must constantly guard against. Prof. J. B. Smith gave some examples of similar instances of voluntary or involuntary deception prominent among which are the many cases of larvæ of *Eristalis tenax* said to have been passed by patients, and one case where a large living Cerambycid larva was said to have been vomited. All these cases, when sifted, leave, as in the spider bite cases, a considerable element of doubt. A discussion was started on the unreliability of lay testimony, in which Drs. Mc. Cook, Skinner and Castle took part, in which were related cases of spider bites sifted, and a case where a lizard, said to have been living for a long time in the body of a patient, was dissected, and in which were found abundant undigested remains of insects of several orders.

Dr. Skinner gave the results of some observations made by Mr. Aaron and himself on the oviposition of *Argynnis* and he finds that all observed species drop their eggs while hovering over the food plant, and do not oviposit on leaves.

Prof. Smith called attention to the fact that *Crioceris asparagi* stridulates, and describes the stridulating organ. The fact is well known in Europe, but has not been noted before in this country.

A Curious Deformity in Cychrus.

A male specimen of *Cychrus nitidicollis* Chev., var. *brevoorti* Lec., collected by Morrison in North Carolina, presents a curious deformity. As shown in the figure, the thorax and base of the elytra are connected by an oval, slightly flattened tubercle rigidly uniting the two, and thus preventing the normal movements of the thorax.

G. W. J. Angell.

Rhinebeck, N. Y., June 10, 1889.

Dear Sir:—I noticed in the May number of "Ent. Amer." a method of relaxing Lepidoptera by means of alcohol, which I have tried during the past week. I used a bowl with alcohol in the bottom, a wire gauze to hold the specimens, and covered with a plate. It worked well, much better than water, and I found that specimens relaxed better, dried quicker, and were not moulded. I wish to thank you for the suggestion.

Harrison G. Dyar.

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CONTRIBUTIONS TOWARD A MONOGRAPH OF THE NOCTUIDÆ OF TEMPERATE NORTH AMERICA: GENUS OLIGIA *HÜBNER.**

By John B. Smith.

Genus **OLIGIA** *Hübner.*
Verzeichniss bek. Schmett. 404.

Mr. Grote characterizes the sub-genus *Oligia*, as follows:—"A slight form, allied to *Hadena*, apparently distinguishable by the more curved divaricate labial palpi. Antennæ in the male simple, pubescent beneath. Eyes naked with short black lashes. The thoracic squamation consists of narrow scales. Maxillæ rather weak. Abdomen linear; collar broad; thorax crested behind; front broad, exceeded by the palpi. Legs unarmed; the median spurs of hind tibiæ situate without the middle of the joint." To this may be added that the wings are obtuse, and that the anal tuft of the male is rather larger than usual. The genus is not a strongly characterized one, and its characters are mostly negative. The species are small in size, closely scaled as a rule, the maculation usually distinct, and the t. p. line always even *and a little outwardly oblique from costa*—this latter being rather an unusual character and distinctive of the genus.

Of the species listed in our catalogues those described by Guenée have never before been satisfactorily identified, and several different forms have done duty as Hübner's *chalcedonia.* By careful comparisons of long series of specimens with the descriptions, I have succeeded in definitely fixing the species intended by both Hübner and Guenée.

At the head of this series comes *festivoides*, distinguished by shorter, comparatively broader primaries, bright color, and large, oblique reni-

* See Ento. Amer., vol. V, 105, for introduction to this series.

form, outwardly deeply indented and black marked. In common with the two following species this has a pale apical spot, and a well marked claviform.

Chalcedonia is narrower-winged with similar maculation, save that the reniform is smaller, and narrow ; the costal region is also pale as a rule. The secondaries are white, hyaline, in both sexes.

Exesa is larger and more robust, more evenly colored; but else very like *chalcedonia* in maculation. The secondaries are fuscous brown.

The other species lack the apical pale spot and the claviform, the type of maculation being otherwise the same.

Fuscimacula is a very pretty, evenly colored species, grayish fuscous, the lines broad, pale and well defined, and the ordinary spots dusky.

Grata, or *rasilis* as it is generally named, is red-brown, the median lines narrow and white, reniform strongly constricted, with a dusky spot above and below.

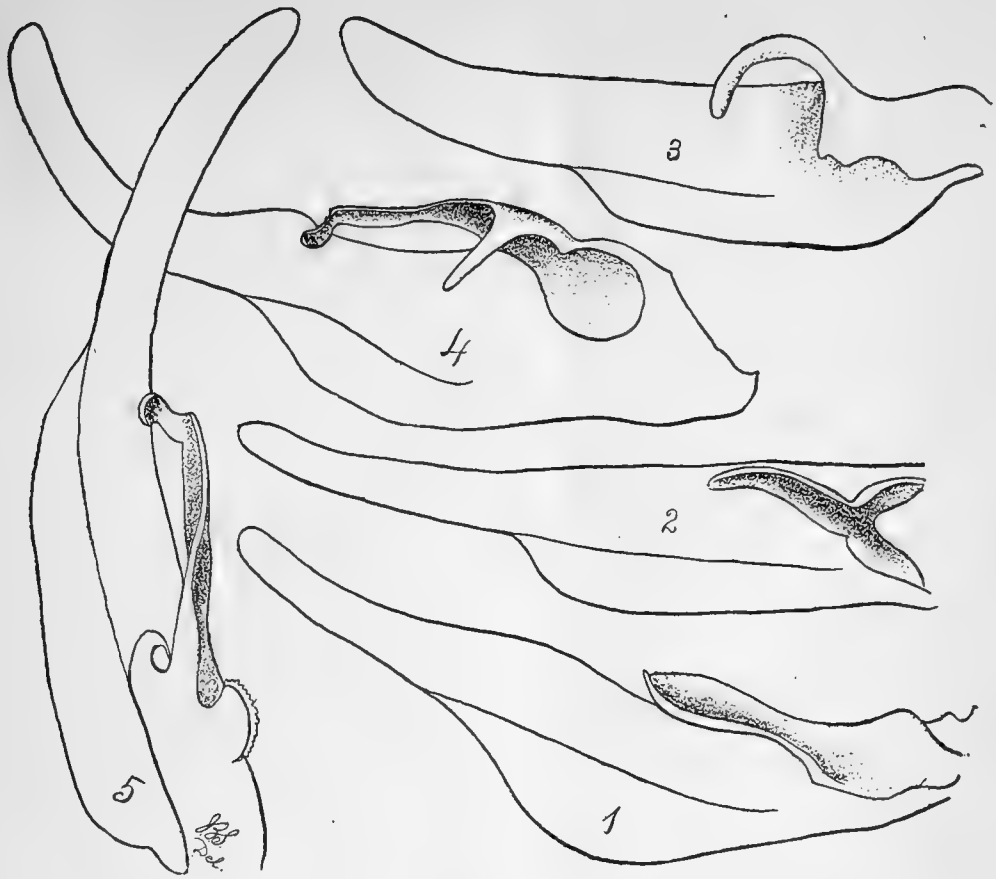
Paginata is dull, smoky fuscous, the maculation obscure and only the median lines well marked and dark—decidedly different from all allied forms.

Versicolor Grt., is known to me in nature, and I have given the description a place next to *chalcedonia* which it seems most nearly allied to, not having been able to obtain a specimen for study at the time of writing.

In synoptic form the species will appear as follows:

Apical spot and claviform present.
  Reniform large, oval, indented outwardly and black marked ; primaries proportionately shorter and broader..... **festivoides**
  Narrower winged, reniform smaller and narrow.
    Size smaller, costa usually discolorous paler, secondaries hyaline, whitish in both sexes.....**chalcedonia**
    Size larger, color more even, secondaries fuscous brown..... .....**exesa**
Primaries without claviform or pale apical spot.
  Ground color yellowish-gray or fuscous, ordinary spots dusky, median lines broad, paler, well defined.....**fuscimacula**
  Ground color red-brown, median lines narrow, pale ; reniform strongly constricted, with a dusky spot above and below.....**grata**
  Dull smoky fuscous, maculation obscure ; median lines dark broad.....**paginata**

The species all agree in the general type of male genitalia. In all the harpes (which I have heretofore called the "side pieces"—for my term supra-anal plate I shall hereafter use the term *uncus*,) are elongate, narrow, with a rounded tip, somewhat curved, and broadening suddenly toward base, where the clasper is inserted. This latter is very various in form and will be described with the species.



Harpes and claspers of 1.—*O. festivoides*; 2.—*O. exesa*; 3.—*O. chalcedonia*; 4.—*O. fuscimaculata*; 5.—*O. grata*.

O. festivoides Guen., Noct. 1, 220, *Celæna*, 1852; Grt., Bull. Surv. 6, 261, *Oligia*; Wlk., Cat. B. Mus., Het. X, 261 (1856), *Celæna*.

Head and thorax carneous gray, collar a rich dark brown. Primaries a fine vinous brown or red, the basal and costal region suffused with carneous gray. T. a. line upright, feebly sinuous, geminate, more or less obliterated by the gray suffusion but sometimes very distinct. T. p. line geminate, bent over reniform on costa then straight to internal margin, accompanied by a more or less evident gray shade. Claviform present, small, pale, dark ringed, rarely complete, often entirely obscured, but usually the lower half visible. Reniform rather large, oblique, deeply indented outwardly, pale, the superior portion usually merged into the pale costal shade. Between the reniform and the t. p. line is a black spot, which extends round the interior margin of the reniform, and between it and the orbicular to the costal pale shade. A somewhat yellowish apical patch before which there is a darker patch on costa; from this the irregular, pale, and interrupted s. t. line extends through the darker terminal space. A row of black terminal spots. Secondaries in the male hyaline at base, the veins and outer margins smoky; in the female smoky. Beneath, primaries glistening, smoky brown, secondaries paler, powdery and with a distinct discal spot.

Expands, .88—1.00 inch. = 22—25 mm.

Habitat.—Can. to Fla. to Texas, West to the Mississippi.

A decidedly variable and yet characteristic species. It is always readily recognizable by the brown collar and the large, oblique reniform,

outwardly deeply indented and black marked. There is also more or less black between the ordinary spots. The female is very often quite uniform in color, the markings disappearing in the uniform soft gray tint, and the characteristic reniform alone showing prominently—from this form to the typical strongly marked male all intergrades are present.

This is the species most usually marked *chalcedonia* in collections, and which I have heretofore so determined. I have not seen *festivoides* identified in collections but am quite certain that this is the species intended by Guenée. His description tallies in all points.

The wings are comparatively somewhat shorter and broader than in the other species. The harpes of the male are as in the other species; the clasper consists of a moderately long spoon-shaped corneous process with a little acute hook at tip. The species is common throughout the middle states, extending to Texas in the south-west and probably to the Rocky Mountains, though I have seen no specimens from further west than Missouri.

O. chalcedonia Hbn., Eur. Schmett., 404, *Oligia*; Treit., Eur. Schmett., 1, 74 (1816) *Bryophila*; Walk., Cat. B. Mus., Het. X, 262 (1856) *Celæna*.

vincta Wlk., Cat. B. Mus., Het., XII, 730, *Miana*; Grt., Ill. Essay, 44, pr. syn.

irresoluta Wlk., Cat. B. Mus., Het. XII, 731, *Celæna*; Grt., Ill. Essay, 45, pr. syn.

tracta Grt., Proc. Ac. N. Sci., Phil., 1874, 204, *Oligia* an var. pr.; Harvey, Bull. Buff. Soc. N. Sci., III, 7, pr. syn.; Grt., Bull. U. S. Geol. and Geog. Surv., VI, 265, (*Hadena*), an var. pr.

arna Gn., Noct. I, 222, (1852) *Celæna*; Walk., Cat. B. Mus., Het. X, (1856) 262, *Celæna*; Harv., Bull. Buff. Soc. N. Sci., III, 7, (*Oligia*).

Head, thorax and primaries grayish-brown, the costal region of primaries paler, and sometimes head, thorax and basal and costal region of primaries luteous, the remainder of wing then of the more usual sober brown. Basal line, when present, geminate; darker brown—in pale specimens the line is wanting. T. a. line geminate, outwardly oblique and somewhat sinuate, the included space somewhat paler. In pale specimens the line is wanting either in part or entirely. T. p. line outwardly bent over reniform, then somewhat sinuate, but as a whole outwardly oblique to the hind margin. It is geminate, the inner line distinct, the outer fainter, sometimes punctiform. The line is accompanied by a broad, diffuse whitish shade band, most distinctly marked on costa and very variably distinct below that point. Beyond this band the wing is somewhat evenly colored, broken into only by the pale, luteous apical patch, from which starts the more or less obsolete s. t. line which is pale, broken and irregular. Claviform small, pale, oval, very much of a size and form with the orbicular, which is often quite indistinct or even absorbed by the pale shading. Reniform small, oblique, a trifle paler, black ringed. A black mark between it and orbicular and another between it and t. p. line. Secondaries white, hyaline, with margins soiled and smoky. Beneath pale, powdery, with a distinct outer line. Collar with a central, darker transverse line.

Expands, .88—1.05 inches. 22—26 mm.

Habitat—Md. to Fla., to Texas.

A decidedly variable species within certain limits, as to size, maculation and color. Sometimes it will be of an almost even dull fuscous brown, the costa but slightly paler, the maculation indefinite; then it will appear with bright distinct markings and even colors, and again with the entire base and costal portion of wing discolorous bright luteous, absorbing all the basal maculation. Between these there is every shade of variation—in fact scarcely two specimens of the large series before me are even nearly alike.

The type form as figured by Hübner represents a specimen with the costa moderately pale, and otherwise well marked: *tracta* Grt., is based on specimens in which the pale shading encroaches still more on the center of the wing, and is simply a somewhat more marked specimen of the type form, while *arna* Gn., is evidently based on well marked specimens in which the costa is concolorous. Consequently *chalcedonia*, *tracta* and *arna* all refer to the same species—*arna* perhaps retainable as a poor variety.

The genitalia are as to harpes of the usual type. The clasper consists of a broad corneous base from which is projected a rather large, sickle-shaped hook.

The insect is common in the southern states and finds its centres of greatest abundance in Texas and Florida.

Hadena (Oligia) versicolor Grote, Proc. Acad. Nat. Sci., Phil., 1874, p. 204; Can. Ent., 1875, v. 7, pl. 1, f. 11.

"Dark brown with a more or less decided ruddy tinge. Primaries shaded with ochreous along internal margin, and with a well sized distinct deeper ochreous apical patch. Ordinary lines obsolete, whitish, broken by black points on the veins; the t. p. line emanates from a distinct and large white spot on the costa above the vague reniform, which latter is preceded by a distinct black shade on the disk, an evident feature of the ornamentation of the wing. Hind wings uniform pale fuscous, silky; beneath as above with a discal dot and distinct darker median shade line. Fore wings beneath blackish with traces of the continuation of the median line, paler terminally. Head and collar brownish; tegulæ paler; thoracic crestings tipped with blackish." Expanse, 20 mm.

Habitat—St. Catherine's, Ontario; N. Y. June.

This species I have identified in at least two collections but cannot recollect where. It struck me as a very distinct form, readily recognizable from the description and figure. It is perhaps nearest to some forms of *arna*, but has a *habitus* quite different.

O. exesa Gn., Noct. 1, 222, (1852), *Celæna*; Wlk., Cat. B. Mus., Het. X, 262, (1856) *Celæna*; Grote in Lists, *Hadena* § *Oligia*; Bull. U. S. Geol. and Geog. Surv., VI, 265.

Head, thorax and primaries, a rich, somewhat yellowish brown, with the maculation distinct. Collar with a darker brown transverse central line. Basal space inferiorly blackish. T. a. line geminate, dark brown, with a central white line. The

line oblique, somewhat convex and slightly sinuate. T. p. line geminate with an outward bend over reniform, below which it is tolerably straight to internal margin. Accompanying the t. p. line is an oblique white shade band not entirely co-incident with the t. p. line. Beyond this line the veins are marked with black scales. At the apex is a paler patch below which the terminal space is irregularly darker brown, and through this the indefinite paler and very irregular s. t. line is traceable; on either side of which are a few irregular black spots, principally beyond the line. Fringes deeper brown. Claviform distinct, narrow ovate, and narrowly ringed with black scales, above which there is a darker, more blackish shade to the ordinary spots. Orbicular small, oval concolorous. Reniform rather large, decidedly oblique, slightly constricted, with a brown central line. A broad black line through cell, interrupted by ordinary spots. Secondaries deep fuscous brown. Beneath reddish with brown powderings and a common outer line. Secondaries paler and with a distinct discal dot.—Expands, 1 inch = 26 mm.

Habitat—Florida.

A single male specimen from Mr. Græf's collection ag ess in every particular with Guenée's description, and forms the type of the foregoing. This species I have never seen named in collections. Mr. Grote refers to it in the 6th Vol. of the Bulletin U. S. Geol. and Geogr Surv., p. 265, as follows: "I have identified *exesa* (from Guenée's description and an outline drawing of his) collected by Mr. Schwarz in Florida."

Since that time I have not seen it referred to, nor do I recollect ever seeing it unnamed in collections.

The genitalia are distinctive and more simple than in its allies. The harpes are as usual, long and narrow. The clasper consists of a single, stout and moderately long corneous hook very slightly tapering to the rounded tip.

O. fuscimacula Grt., Bull. U. S. Geol. and Geog. Surv., VI, 262, *Hadena*, ibid., 265, § *Oligia*.

Head, thorax and primaries brown, with a more or less evident, smooth, bluish gray or olivaceous shading. On the primaries the median and terminal space are most evidently brown, the grayish shading usually suffusing the remainder of the wing. Basal half line distinct in most specimens, brown, geminate. T. a. line geminate, included space slightly paler, preceding line faint, often obsolete, following line distinct, narrow, dark; its course is outwardly oblique from costa, sometimes quite even, sometimes with a single outward curve, and again regularly bisinuate. The t. p. line is also geminate, the preceding line distinct, dark, narrow, the included space pale, but distinct, the outer line faint, quite usually obsolete. The line makes a large outward bend over reniform but is quite even below. Claviform wanting. Orbicular small, punctiform, blackish. Reniform moderate in size, oblique, somewhat constricted, dusky. A dusky shade extends below from reniform, rather close to t. p. line, to the internal margin. This shade is very variably distinct in the specimens at hand. The outer portion of the wing becomes darker, and through the inner margin of this dusky shading the slightly sinuate s. t. line is visible. A row of terminal black dots. Fringe concolorous with terminal space. Secondaries smoky fuscous in both sexes. Beneath dull fuscous or smoky, with a common darker outer line.—Expands, .88—1.00 inches = 22—25 mm.

Habitat—Florida.

There seems very little real variation in this species. All the details are subject to small modification which do not however essentially change the characteristic appearance of the insect. I have seen quite a number of specimens in various collections.

The genitalia of the male are distinctive, yet similar in some respects to those of *paginata.*

The harpes are as usual in the genus. The clasper is rather long, slender, abruptly bent near tip, the extreme tip dilated somewhat spoon-shaped, in this respect agreeing with *paginata.* From near the base extends a long slender spur which terminates in a long acute tip, and this is distinctive.

O. grata Hbn., Zutr., p. 16, No. 36, ff. 71—72, *Elaphria* ; Verz. bek. Schmett. 230, *Elaphria* ; Grt., Bull. Buff. Soc. N. Sci., II, 22, *Caradrina.*

rasilis Morr., Pr. Bost. Soc. N. H., 1874, v. 17, p. 158, *Hadena* ; Grt., Can. Ent., VII, 58, pr. syn.; id. 12, 86 ; Bull. Buff. Soc. N. Sci., II, 211, pr. syn.; Bull. B'klyn Ent. Soc., vol. 3, p. 39, pr. syn.; Bull. U. S. Geol. and Geog. Surv., VI, 265, *Caradrina.*

Head, thorax and primaries evenly brown, with faint gray powderings, the veins marked with blackish scales. Primaris with basal line very indefinite, scarcely traceable, pale. T. a. line narrow, whitish, defined by a few darker scales at each side, evenly oblique outwardly, or slightly curved, rarely somewhat sinuate. T. p. line narrow, white, sinuate, with a slight outward curve over reniform, and a very slight inward curve below. The orbicular is very small, punctiform, consisting of a dusky dot narrowly ringed with whitish. Reniform whitish ringed, narrow, strongly constricted in the middle, the bulbous upper and lower portions dusky. S. t. line slightly paler, indefinite, irregularly but not greatly sinuate. The terminal space a trifle paler than ground color, fringes somewhat darker. Secondaries pale fuscous, whitish in the ♂, with a glistening reddish tinge. Abdomen of the same hue as secondaries. Beneath both wings powdery, with an outer dusky line and a faint discal dot most distinct on secondaries. Primaries darker, secondaries whitish basally.

Expands, .88 - 1.00 inches = 22 - 25 mm.

Habitat—Md. and south to Fla., Tex., Mo.

This species is readily distinguished by the red-brown color and even, narrow, pale median lines. The punctiform orbicular, and constricted reniform are also characteristic. The species is not uncommon throughout the southern states.

The genitalia are distinctive. The long narrow, and strongly curved harpes are very much as in the allied species. The clasper, arising from a somewhat irregular corneous base, is long, slender, and somewhat twisted, rectangularly bent toward tip, the spur short and ending in a spatulate tip.

There has been considerable discussion between Messrs. Morrison and Grote, as to which species Hübner's figures really refer. Mr. Morrison contends that they refer to *Tæniocampa oviduca* Gn., and Mr. Grote sees in them the present species. Careful examination of the figure

leaves it in doubt, with the probabilities in favor of Mr. Morrison's being right. There is, however, quite as much justice in referring the figure to the present species, and this is done because *oviduca* is everywhere well known under that name while the present species is much less common and well known. As in one or two other instances it is impossible now to be certain what species Hübner had before him, and unless we prefer to carry unidentified names on our catalogue we must make at least an approximate identification.

O. paginata Morr., Pr. Ac. N. Sci., Phil., 1875, v. 27, p. 64, *Hadena*; Grt. Bull. Surv,, 6, 261, *Hadena.*

"Expanse, 24 mm. Length of body 9 mm. Abdomen smooth and untufted. Form slight. Habitus and markings of *H. rasilis* Morr., and *H. chalcedonia* Hübn.

Ground color of anterior wings uniform gray, the markings very simple; the median lines are black and simple, the exterior line extends from the inner margin just before the internal angle, obliquely across the wings, turning out, and forming a rounded projection opposite the reniform spot; the interior line extends obliquely to the usual place of the orbicular spot, it then continues irregularly to the costa; the half line present; the ordinary spots are very small, the orbicular usually obsolete, the reniform whitish; they are connected by a narrow intense black dash, which sometimes encircles the spots, thus uniting together the median lines; the sub-terminal line obsolete. Posterior wings white, usually crossed by a blackish median line.

Beneath, the anterior wings are blackish, the posteriors white, both are crossed by a common median line."

Habitat—Florida.

"This species occurs rather abundantly where it is found; * * *."

The above is from Mr. Morrison's original description. The only specimen I have seen is a ♂ from Mr. Tepper's collection marked type by Mr. Morrison. It agrees in every respect with the description save that the markings are hardly as distinct as described. The wings are somewhat twisted so that it was considered preferable to give the original description rather than risk a new one from this specimen.

The even dull dark gray color, the even, single, black median lines and want of an s. t. line will readily serve to identify the species. It is passing strange that it has not been turned up again so far as I can find, in recent collections. The genitalia of the specimen were fortunately exposed. The harpes are as usual, long and narrow, ending in a somewhat acute tip. The clasper is a broad corneous plate at base, the superior angle produced into a short acute point, the inferior portion produced into a flat strongly curved process which divides at tip, one process being acute, the other rounded. It resembles none of the other species in this respect.

Since the above was written I have seen a fine specimen of this species fully bearing out Mr. Morrison's description but adding nothing new to what I have said above.

The Home of Seirarctia Echo.

By Annie Trumbull Slosson.

In the Spring of 1888 I was so fortunate as to capture at Punta Gorda, Charlotte Harbor, Florida, two specimens of *Seirarctia echo* A. & S. I had known the moth previously only by the meagre description and accompanying plate in Insects of Georgia; and few of the entomologists to whom I showed my specimens had ever seen the species. Mr. Henry Edwards thought the fact of this capture worthy of a note in Ent. Amer., and I was very proud of my treasures.

In February of the present year I was again in Florida, at Ormond, on the Halifax River. The hotel is situated on a strip of land, from a half to three-quarters of a mile in width, between river and ocean, called locally "the peninsula." A few evenings after my arrival there I took upon a lighted window a fine specimen of *S. echo*. The next night another flew into the reading room. Soon afterward in a walk through the woods I found two or three others, apparently just emerged. In the midst of my excitement over these captures I met an intelligent resident of the town, and spoke of what I had found, their interest and rarity. The lady looked surprised and exclaimed: "Why, you surely cannot mean our common moth that comes from the army worm!" I had, previous to this, heard much of a very destructive caterpillar of the peninsula, which travelled in vast armies, devouring all in its path. And now I was to learn that this dreaded pest was the larva of the beautiful moth, so rare in collections, Abbott and Smith's *echo*. I talked with many of the Ormond people on this subject, and collected many facts. These larvæ overrun the whole peninsula and do great damage to garden plants. They are an annual pest, but in certain years are greatly increased in numbers. All my informants agree upon one point, that these larvæ invariably travel towards the north, and are never seen heading towards any other point of the compass. So well is this understood that, in protecting their gardens from the ravages of these caterpillars the inhabitants dig trenches on the south, east and west sides of the ground, leaving the north side open; and none ever enter from that direction. A lady writes: "My father built a sand-wall about a foot high around the south and east sides of our place, with the perpendicular side out, and it kept them out for a good while, until they undermined it by constant crawling up and down in an endless procession, determined to get by. He had no wall on the north side, but not a worm came in." She also writes, "They eat everything, almost,—except orange trees—but their favorite food is anything growing from a bulb,

like Coontie, and lilies of all kinds. Mamma lost all her longifolium lilies in one night, and they ate her Sago Palm clear down into the ground, fairly hollowed out the bulb." I was told that the eggs were generally laid upon Coontie, (*Zamia integrifolia*, one of the *Cycadaceæ*), often called Sago Palm; but I never once found them upon this plant. Nearly all I saw, and they were very many, were on the Dwarf palmetto. They were laid in patches of from one hundred and fifty to two hundred eggs, arranged in regular and symmetrical rows, very close together. They were nearly globular in form, though flattened at base, cream white or palest yellow in color, passing day by day into amber, orange and red, and becoming at last dark lead color, almost black before hatching. This took place on the tenth day. The young larvæ fed freely on lettuce, eating enormously. Once, having exhausted their food-supply they devoured a large piece of the muslin which covered their jar, and this not to make an aperture through which they might escape, but for food, as not one ran away. On another occasion when the larder was low, some of them made a raid upon some specimens on my drying boards, and ate the wings of several small moths. When shaken from their perch they always spun a thread by which to hang. Being quite inexperienced in the examination and description of larvæ I made but few notes, and these are quite incomplete. I was also travelling from place to place during the growth of the caterpillars, and lost many of them in transportation.

But I sent some eggs, on the day they were laid, to Prof. Packard. These reached him safely on the eve of his departure for Europe, and he placed them in the hands of Mr. Joseph Bridgham for delineation. Mr. Bridgham writes me that he has drawn them, much enlarged, in all stages, so that their history will be beautifully preserved. I also gave two full-grown larvæ, of the five I brought home, to Mr. Henry Edwards, who described them fully and technically, as I was unable to do. The larvæ, when first hatched, were very pale yellow, head shining black, dorsal shield very prominent, black and shining, each segment bore a transverse row of tubercles from each of which sprang a single long hair, those on the back being black, those on sides white. Mr. Bridgham writes: "The tubercles did not change in position during any moulting, but changed much in regard to size. The long hairs, at first single and double from the various tubercles, soon gave place to shorter and more numerous ones. The dorsal shield on first segment diminished in size at each change and the color of head and face also changed. I have mounted a few of the hairs for examination under the microscope, as they seem barbed peculiarly.

The following is Mr. Edwards' description of adult larva.

Larva of **Seirarctia Echo** Abb. & Sm.

Head narrower than the 2nd segment, the two lobes very globose, and glossy; color bright chestnut, almost a dull orange; mouth parts sordid white. Body deep velvety black upon the dorsal and subdorsal regions, chestnut color laterally. Across the segments are two very distinct transverse maculate bands of pale yellow, the posterior band becoming less distinct after the 7th segment until it is only a series of spots. The bands do not extend beyond the subdorsal region. On the anterior edge of each segment is a row of large chestnut colored tubercles, bearing strong spines, chestnut at their extreme base, black otherwise. Whole of the underside, as well as the anal clasps, legs and thoracic feet bright chestnut, the latter tipped with black. Length, full grown, 52 mm.

The arrangement and size of the tubercles, the comparatively small head, and the rows of strong, almost bristly spines, indicate the close relation of this genus to *Ecpantheria*, and it should undoubtedly hold its place in the series near *Ecpantheria* and *Arachnis*.

Neither of my three remaining caterpillars pupated. They spun flimsy cocoons, fastening pieces of lettuce-leaf together by silken threads, but died before transformation. Mr. Edwards was more fortunate. He wrote: "The one larva has spun up, the other will do so in a day or two. The web is formed of a lettuce-leaf, fastened to the top by a very few fine silk threads, and, after spinning, the larva ate a small piece of the leaf. The change to pupa took place three days after the web was formed. The pupa at first was pale tawny yellow, changing on fourth day to bright chestnut." Later he writes: "One moth emerged in the night of 26th (May), so that it had been 21 days in pupa state." I also received from Florida specimens of second brood, about third week in May.

Notes on the Catalogue of Phycitidæ and Galleriidæ of N. America by Mr. Ragonot (Ento. Am., Vol. V, p. 113).

By Geo. D. Hulst.

The following species of the catalogue do not belong to the fauna of North America:

Phycita arctella Rag., from the Bahamas, *Euzophera sonorella* Rag., from Mexico, and *Epimorius testaceellus* Rag., from Jamaica.

The following species described from Mexico, I have received from our own country, and they are therefore properly in the catalogue: *Euzophera aglæella* Rag. I have received from Utah, and *Homœosoma illuviella* Rag. I have received from Texas.

The following species have not yet been described: *Lipographis subosseella* Hulst, *Nephopteryx gilvibasella* Hulst, and *Ephestia nigrella* Hulst. These with others will probably be described later. The first does not belong to our fauna.

The following species of the catalogue were described with no locality except "N. America." As Mr. Ragonot seems to include the

West Indies and Mexico under that term, it is possible that a few may not belong to our fauna; *Myelois bilineatella* Rag., *M. duplipunctella* Rag., *Ortholepis jugosella* Rag., *Nephopteryx crassifasciella* Rag., *Meroptera uvinella* Rag., *Salebria subfuscella* Rag., *Epischnia ruderella* Rag., *E. granitella* Rag., *E. fulvinigella* Rag., *Diviana eudoreella* Rag., *Sarata nigrifasciella* Rag., *Vitula serratilineella* Rag., *V. basimaculatella* Rag., *Homœosoma anguliferella* Rag., *Aurora longipalpella* Rag., *Mellisoblaptes fuscolimbellus* Rag., *Navasota hebetella* Rag.

The following described without locality except N. America, I have obtained as follows, so they certainly belong to our fauna: *Acrobasis palliolella* Rag. from Canada, *Nephopteryx rubrisparsella* Rag. from Texas, *N. rhypodella* Hulst (*curvatella* Rag.) from Illinois, and *Salebria nubiferella* Rag. from Texas.

The following species described from the United States or British America are not in the catalogue in any way: *Acrobasis nebulella* Riley, *Nephopteryx subcanalis* Walk., *Stantira variegata* Walk., *Sebunta guttulosa* Walk., *Benta expandens* Walk., *Nephopteryx seminivella* Walk., *Cutina albopunctella* Walk., *Subrita ? abrostolella* Walk., *Myelois coniella* Rag., *M. altensis* Wocke, *Calera punctilimbella* Rag. *Acrobasis demotella* Grote, *Sebunta guttulosa* Walk.,—I am told = *Botis illibalis* Hb.

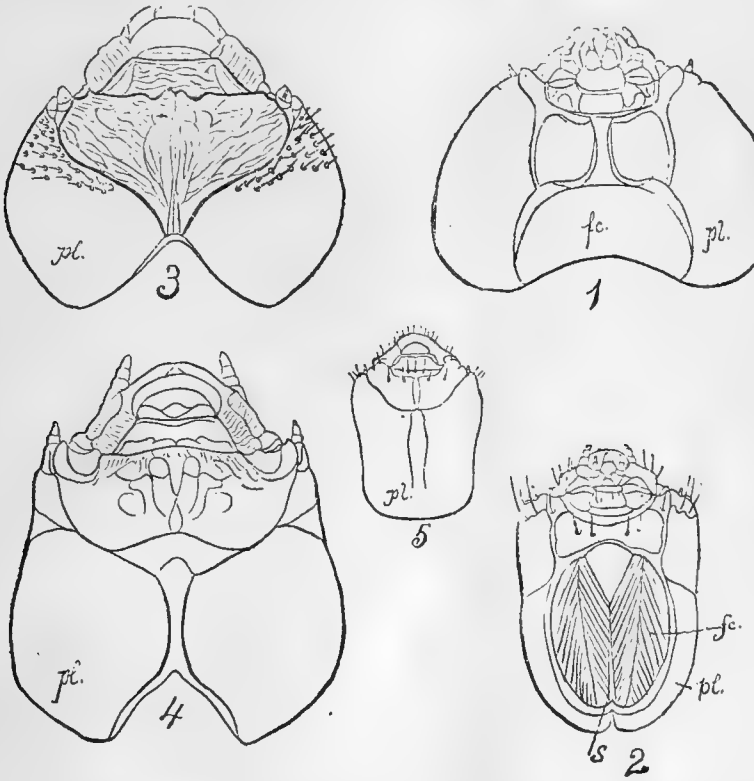
Of the species which Mr. Ragonot has not seen I can with certainty determine the following: *Nephopteryx aurantiacella* Grt. is *Dioryctria miniatella* Rag., *Neph. caliginella* Hulst is *Acrob. comptella* Rag., *Mega. edwardsella* Hulst is *Megasis polyphemella* Rag., *Aner. excantella* Hulst is *Meg. pullatella* Rag., *Neph. perfuscella* Hulst is *Sarata dophnerella* Rag., *Sperm. montinatella* Hulst is *Honora canicostella* Rag., *Neph. carneella* Hulst is *Neph. inquinitella* Rag., *Neph. edmandsii* Pack. is *Vitula dentosella* Rag. In all these cases Mr. Ragonot's names become synonyms. Mr. Ragonot's generic references however are probably correct.

My present intention is to make no criticism upon Mr. Ragonot's references of the species of other authors. I will only remark that on the basis of Prof. Zeller's types in the Cambridge Museum his reference of Prof. Zeller's species is not always correct.

Notes on Cerambycid Larvæ.

The admirable work by the late Prof. J. C. Schiœdte "De metamorphosi Eleutheratorum observationes" published in 11 parts in Krœyer's "Naturhistorisk Tidsskrift" (vol. I—XI, 1862—1880,) contains by far more than disconnected descriptions of Coleopterous larvæ and their illustrations. The work ought to be in the hands of everyone interested in the early history of Coleoptera. The "Conspectus morphologicus"

and the "Conspectus systematicus" which Schiœdte prefaced to several large families especially studied by him, form a key to the determination of larvæ; but these keys are by no means always in a convenient form, e. g. in the family *Scarabæidæ*. In the *Cerambycidæ* he gives concise diagnoses of the larval characters of the various sub-families, and Prof. Ganglbauer (Bestimmungstabellen der Europäischen Coleopteren, VII, Cerambycidæ, in Verh. K.-K. Zool.-bot. Ges. Wien, XXXI, p. 681, 1881), has brought these diagnoses into the form of a synoptic table, illustrating the same with copies from some of Schiœdte's figures. Since both the original text of Schiœdte and Ganglbauer's paper are not generally known in this country and certainly have not been used by those who have described North American Cerambycid larvæ, we think we are justified in devoting some space to a translation of the table given by Ganglbauer, the accompanying figures having been copied by Dr. Geo. H. Marx in outline, direct from Schiœdte.



EXPLANATION OF FIGURES.

Fig. 1.—*Asemum striatum* L.; head of larva from beneath (copied from Schiœdte, l. c., pl. XIV, fig. 2).

Fig. 2.—*Saperda carcharias* L.; head of larva from beneath (copied from Schiœdte, l. c., pl. XVIII, fig. 12).

Fig. 3.—*Rhagium mordax* Fabr.; head of larva from above (copied from Schiœdte, l. c., pl. XVII, fig. 1).

Fig. 4.—*Prionus coriareus* L.; head of larva from above (copied with omission of anatomical details from Schiœdte, l.c., pl. 12, fig. 1).

Fig. 5.—*Pogonocherus pilosus* Fabr.; head of larva from above (copied from Schiœdte, l. c., pl. XII, fig. 14).

pl, pleuræ of head; *fc*, occipital opening; *s*, septum dividing the occipital opening.

*SYNOPTIC TABLE OF CERAMBYCID LARVÆ.**

Head transverse; longitudinal diameter of occipital opening (foramen cervicale) generally shorter than the transverse diameter; posterior part of head, *i. e.* part invaginated into the prothoracic segment, not divided by a longitudinal wall. ... [fig. 1] **CERAMBYCITÆ**

Pleuræ of head dorsally entirely separated, diverging posteriorly ..... [fig. 3] **Lepturini**

Pleuræ of head dorsally anteriorly connate, posteriorly separated and diverging ..... [fig. 4] **Prionini**

Pleuræ of head connate throughout, posteriorly separately rounded ..... [fig. 1] **Cerambycini**

Head oblong, much longer than wide; longitudinal diameter of occipital opening much longer than the transverse diameter; invaginated portion of head divided into two halves by a longitudinal wall to which the muscles of the mandibles are attached [fig. 2].

Pleuræ of head dorsally connate throughout, posteriorly conjointly rounded..... [fig. 5] **LAMIITÆ**

The two sub-families in the above table are those proposed by James Thomson in 1864 (Sistema Cerambycidarum), and Ganglbauer maintains that this division is justified by the fundamental difference in the structure of the larval head (figs. 1 and 2). The second sub-family, *Lamiitæ* (Thomson's *Metaulacnemitæ*) corresponds exactly with the *Lamiinæ* of our Classification by Leconte and Horn. His division *Prionini* of the first subfamily, *Cerambycitæ* (Thomson's *Analaucnemitæ*), corresponds with the sub-family *Prioninæ* of Leconte and Horn and his two remaining divisions combined correspond with Leconte and Horn's sub-family *Cerambycinæ*. From his synoptic table of the imagos (l. c., p. 684) it is evident that Ganglbauer has great difficulty in separating his *Lepturini* as equivalent to the *Prionini* and *Cerambycini* and Leconte and Horn include them as a "series," *Lepturoides*, in the sub-family *Cerambycini*: but from the larval characters it would appear that the *Lepturini* are not only most readily separated from but also equivalent to the *Prioninæ* and *Cerambycinæ*.

The importance of the above table for the determination of Cerambycid larvæ is evident; all that is necessary to do is to detach the head of the larva, and a glance at the occipital opening and the pleuræ of the head will be sufficient to refer the larva—even without the aid of a lens—to one of the great divisions of the family. J. B. S.

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* The above table expressed in the original language used by Schiœdte and compiled from the Conspectus morphologicus and Conspectus systematicus, reads as follows:

Foramen cervicare transverse rotundatum.

Pleuræ capitis pone epistoma spatio longiole concretæ, post dehiscentes, angulatæ.. **Prionini**

Pleuræ capitis pone epistoma ad apicem ferme concretæ, post singulatim rotundatæ.. **Cerambycini**

Pleuræ capitis pone epistoma dehiscentes, angulatæ ..... **Lepturini**

Foramen cervicale oblonge ovatum, septo divisum ante decrescente, cui musculi adductores mandibularum affiguntur.

Pleuræ capitis pone epistoma per totam longitudinem concretæ, post conjunctim rotundatæ..... **Lamiini**

Count Eugene Keyserling.

By the death of Count Eugene Keyserling of Germany, Natural Science lost one of its prominent and most ardent workers, Arachnology one of its masters.

His loss is not only felt and deeply deplored in his Fatherland, it is on this side of the Atlantic more keenly appreciated than that of any other naturalist of his rank. For the last twenty-five years Count Keyserling has contributed more to the knowledge of that difficult and long neglected chapter, *American Arachnology*, than any other naturalist in this country or in Europe.

Besides his many descriptive pamphlets on that subject Keyserling has left to us two works by which he set for himself a monument on this hemisphere: the Monographs on the *American Laterigradæ* and *Theridiidæ*. He commenced a third monograph on the *Epeiriidæ*, but unfortunately postponed it, taking in hand the continuation of Dr. L. Koch's great work "Die Arachniden Australiens," Dr. Koch himself being compelled to retire on account of impaired eye-sight.

Count Eugene Keyserling, born on the 4th of April 1833, died, exactly 56 years old, on the 4th of April of this year, of tuberculosis of the brain. He was born in Pockroy in the Russian Baltic Province Curland and entered the university of Dorpat, in 1851, to study Natural Sciences. From 1856 to 1858 he visited different parts of the Russian Empire and in 1859 he participated in a Government Expedition to the Kaukasus, Armenia and Persia. In 1860 he went to England and then to Africa; but was, in Algeria, attacked by a fever, which compelled him to return to Europe. In 1864, after having spent some time in France, he intended to visit South America. Previous to his departure however, he visited Switzerland, where he made the acquaintance of a lady, whose attractions caused him to abandon his projected trip to this continent, and he married and settled down as a practical agriculturist, having bought a large estate in Silesia. Here he worked undisturbed and diligently on the Spider fauna of North and South America, receiving specimens from his many friends on this side of the Atlantic.

All American naturalists who had occasion to correspond with Count Keyserling are unanimous in their praise of his amiability, gentleness and liberality, and his untimely departure awoke in many hearts on this continent a deep sorrow and regret at having lost a good friend.

The following is a list of his papers:

1862.—Beschreibung neuer Spinnen aus den Höhlen von Desina (Verhandl. der zool. bot. Gesellsch. Wien).
1863.—Beschreibung neuer Spinnen (Verhandl. der zool. bot. Gesellsch.).
1863.—Beschreibung neuer Arten der Fam. Orbitelæ im Sitzungsber. d. Isis, Dresden.
1865.—Beiträge zur Kenntn. der Orbitelæ, Verhandl. der zool. bot. Gesellsch. Wien.
1876.—Ueber amerik. Spinnen der Citigradæ, " " " " "
1877.—Amerik. Spinnen der Fam. Pholcidæ, Scytodoidæ und Dysderoidæ, Verh. d. zool. bot. Gesellsch. Wien.
1878.—Spinnen aus Uruguay und anderen Gegenden Amerikas, I, II, III. Verh. d. zool. bot. Gesellsch. Wien.
1879.—Spinnen aus Amerika, I. Verhandl. der zool. bot. Gesellsch. Wien.
1880.— " " " II. " " " " "
1880.—Die Spinnen Amerikas—*Laterigradæ.*
1881.—Neue Spinnen aus Amerika, III, Verhandl. der zool. bot. Gesellsch. Wien.
1882.— " " " " IV, " " " " "
1883.— " " " " V, " " " " "
1884.— " " " " VI, " " " " "
1884.—Die Spinnen Amerikas—*Theridiidæ*, I.
1886.— " " " *Theridiidæ*, II.
1887.—Neue Spinnen aus Amerika, VII.

Since 1881 Count Keyserling undertook the continuation of Dr. Koch's "Die Arachniden Australiens."

Washington, D. C., July 1st. GEO. MARX, M. D.

THERE has been considerable objection to the use of shellac for mounting insects, especially duplicates, because of the difficulty of dissolving the shellac if it is desired to re-mount the specimen. Alcohol acts very slowly, and sometimes boiling in alcohol is necessary, especially if the shellac be impure, or the specimen very dirty. Mr. Lugger has suggested a remedy which we have tried and found excellent. Pin the specimens on the underside of the cork of a wide-mouthed bottle containing chloroform, and in a short time the vapor of the chloroform will absorb the shellac, leaving the specimens lying loosely on the cards. We have found shellac much the most satisfactory medium for mounting. We get the ordinary commercial white shellac varnish, put a little of it into a small shallow bottle and let it evaporate to the proper consistency. If it gets too thick, a little alcohol will remedy that. For repairing insects nothing sets so quick or holds so hard.

It does not seem to be generally known that chloroform is by far better than benzine for cleaning greasy specimens, both Coleoptera and Lepidoptera. They can be safely submerged in it without injury. To clean old dirty beetles put them in hot water, let it come to a boil, and with a brush wash carefully—then put into chloroform, and when your specimen is re-mounted it is just as good as new. Only—you cannot use that process more than once. It takes a little judgment in applying, and especially in the boiling, for an overdose would result in a separation of all the parts.

COLLECTING NOTES.

By Charles Liebeck.

About May 5, 1888, while collecting Coleoptera near Westville, N. J., my attention was attracted to a small beetle running actively on the ground, which proved to be a specimen of *Mecynotarsus candidus* Lec. Casting about for more I succeeded in capturing 8 or 10 specimens. This pretty and delicate looking beetle being represented in but one collection in this city, *i. e.* that of Dr. Horn, my small supply soon became exhausted. This season, on the 4th of May, I again visited the same locality and succeeded, after hunting for about two hours, in taking about 40 specimens. It is exceedingly difficult to find these beetles, as they frequent bare, dry spots, where their uniform color exactly matches that of the ground, which probably accounts for its escaping the notice of collectors. The method I have used was to select a bare spot and scoop up about $^1/_2$ inch deep of the loose surface covering and deposit it upon a piece of stiff paper two feet square. After waiting a few minutes, one and sometimes two specimens would suddenly dart across the loose earth and just as suddenly stop, usually among a few grains of sand, where it was simply impossible to distinguish them until they again moved. This insect must be very widely distributed as it occurs from N. J. to Florida and Iowa. On the same day I noticed an unusual carnivorous inclination on the part of a single *Hister biplagiatus*. It victim was a smooth caterpillar, about $1^1/_4$ inch long, which it had seized on top of the second segment, burying its head beneath the skin after the manner of a tick. For fully 15 minutes I watched them, during which time the unlucky caterpillar's frantic struggles failed to dislodge its assailant, who never once relaxed the grip of its jaws. By this time the caterpillar was covered with the juice oozing from its wound, and having satisfied myself of the intention of the *Hister*, I consigned them both to the alcohol bottle for future reference. My previous knowledge of the habits of this *Hister* has been confined to the droppings around pig-pens, where it may possibly feed upon the numerous larvæ found in such places.

A new remedy for ridding an infested collection of its undesirable guests was given me at the meeting of the Newark Ent. Soc., recently, by one of the members. It is the introduction of a specimen or two of the little *Chelifers*, known as paper scorpions. They will, my informant said, destroy every living thing in the boxes, but will not harm the dried specimens.

Book Notice.

A Preliminary Monograph of the North American species of Trogophlœus; by Capt. Thos. L. Casey. Ann. N. Y. Ac. Sci., v. IV, 1889, pp. 322—383.

In this paper, Capt. Casey seems to have done good work so far as it is possible to judge without actually testing it in collections. The characters used seem clear, the tables are concise, and the descriptions terse—an inprovement perhaps on former papers where excessive length of description was criticised. No sexual characters are used or even mentioned, though in many other Staphylinide genera they are of the highest value. 66 species are recognized, most of them new, and a large proportion of them based on single specimens—a perhaps unavoidable element of weakness, since it is much more difficult to judge of the value of characters. In some respects the most interesting part of the paper, and one meriting thought, is in the introduction, largely devoted to defending the microscope *versus* the hand lens, and somewhat impugning the value of results attained by using the latter. Now here an element comes in which Capt. Casey himself recognizes, when he speaks of "the novice who has not yet learned to interpret what he sees"—it is the experience of the user of either lens or microscope. Behind each is an instrument which is much more important—the trained eye of the observer—the eye that with a good triplet can count the joints of a Trichopterygid antenna, while the untrained user of the compound microscope cannot with an infinitely greater magnifying power be sure any joints exist. Now I am a believer in the microscope, and I use it continually in my work. I have had a binocular stand in use for several years, and have a very fine instrument for my college work—yet it has happened to me frequently that I have taken a specimen from the microscope and studied it with the lens with much more satisfactory results. I saw more and saw it better. Increase in the size of the image does not always import increased distinctness of detail. Discretion in the use of appliances must be exercised and the man who uses a microscope only, is apt to make as many errors as a man using the lens only. It is in the interpretation of what is seen, that the errors are made. It is the experience of the observer, and his ability to select those characters which are of importance, that determines the character of the work: that experience which enables a man to recognize specific characters among the assemblage presented by any given group of insects—which enables him to recognize the limits of variation—which will enable him to discard striking modifications in many instances as unsafe, and rely upon inconspicuous features for specific characters. No hard and fast rules can be formulated for the conscientious student: he will be a "lumper"

in one family, a "splitter" in another: he will unite forms considered as distinct, or will separate forms generally regarded as identical: nature does not work in grooves, and it is unsafe to speculate in one group from what is known of another, nor because sculpture in genus *A* furnishes safe characters to treat genus *B* as though it must necessarily furnish the same here.

Capt. Casey advocates more accurate measurements, or statements of the proportion of parts, and suggests a micrometer scheme for that purpose which is very much inferior to some already in use. An adaptation of the ordinary eye piece micrometer will answer every purpose, and just exactly the instrument for the purpose is in constant use by Dr. Marx to obtain accurate proportions in drawing. But with the instrument perfect, I am not at all so sure that accurate measurement will help us much. I feel very certain from my own observation that there is a considerable range of variation in the proportion of parts, and the use of instruments for minute measurement would have the inevitable tendency to a creation of species on characters not sufficiently stable, until experience showed where it could be safely used. Yet nevertheless Capt. Casey's suggestions are good and timely, but it simply needs great caution in using them. Despite the fact that entomologists have been very conservative—perhaps too much so—in adopting more perfect modern means of investigation, our science has not been at a standstill, and we are annually making equal strides with other departments of Zoology in the increase of knowledge.

This is not perhaps all entirely *apropos* of the work on *Trogophlœus*, which seems very good—but it is called forth by that portion of the paper which is equally impertinent to the subject matter of the title. Capt. Casey is a reformer, and like most other reformers apt to overdo matters a little. But on the other hand he will undoubtedly find followers, and even the most conservative will take leaf after leaf of his book until all the good ones are gone—then Capt. Casey will be made responsible for the useless balance, while small credit indeed will be given for the good results caused. I am very much in sympathy with Capt. Casey in his general ideas and methods—but do not always agree with him in his deductions. J. B. S.

And now comes into court, Mr. Robert H. Lamborn with a proposition to destroy the mosquito, root and branch, by setting the dragon flies on them;—a very good scheme—only impractical unless a species of dragon fly can be produced which will prefer woods and city streets to the open ditches and grassy margins of swamps. We shall have more to say on this subject before long.

Notice of Meeting at Toronto.

The Entomological Club of the A. A. A. S. will meet at 9 A. M., on Wednesday, August 28, in the room of Section F, University Buildings, where members of the Club will register and obtain the Club badge. Members of the Club intending to contribute papers will send titles to the President, Mr. James Fletcher, Government Experimental Farms, Ottawa, Can.

An Association of Economic Entomologists.

The question of forming an Association of economic entomologists, suggested by Prof. Riley, has begun to assume shape. Mr. Fletcher and ye editor have been in communion with Mr. Howard, acting for Prof. Riley, and a scheme has been concocted for submission to the disciples. A call will be circulated within a few days, signed by the gentlemen above named, for a meeting to be held at Toronto, Canada, during the meeting of the A. A. A. S. The exact day and place have not yet been settled, but all of the entomological members of the A. A. A. S. are earnestly urged to attend at Toronto, as matters of considerable importance to entomologists will probably be presented, and a full discussion is desirable.

Society News.

Brooklyn Entomological Society, June 4, 1889.—Fourteen persons present. Mr. Hulst was elected chairman *pro tem.*, the president and vice-president being absent. Reports were presented by the treasurer, librarian, recording secretary and curators. The president of the society was authorized to present the name of Mr. W. C. Wood of New York City to the council of the Institute for admission to membership therein. Mr. Meeske was appointed a committee of one to arrange joint excursions of the society with other departments of the Institute.

Mr. Weeks read a paper on "Diurnal Carabidæ in the Vicinity of New York," giving a list of the species observed by him as displaying natural activity during the day time with the seasons and circumstances under which they occured and showing habits identical with those of allied European species.

Messrs. Hulst and Smith added to the list. Mr. Meeske suggested that many Carabidæ are involuntarily active during the day by the disturbance of or evaporation of moisture, near their places of concealment.

Each member who could be in attendance at the meeting in September next was requested to prepare and read brief notes upon his experience in collecting during the season in lieu of a stated paper. A. C. WEEKS, *Rec. Sec'y.*

ENTOMOLOGICA AMERICANA

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Review of the North American Species of Pediopsis.

By E. P. Van Duzee, Buffalo, N. Y.

The family *Bythoscopidæ*, to which this genus pertains, is separable from its allies by the position of the ocelli, which are found on the face, more or less remote from its superior margin; the vertex is narrow and confounded with the front, or apparently wanting, the head being entirely deflexed; and the elytra are membranaceous or but slightly thickened. Six northern genera have been established:

Idiocerus Lewis, Trans. Ent. Soc. Lond., I, p. 49, 1834.
Macropsis Lewis, Trans. Ent. Soc. Lond., I, p. 49, 1834.
Oncopsis Burm., Genera Ins., I, plate 10, 1846.
Stragania Stäl, Rio. Jan. Hemip., II, p. 49, 1861.
Pachyopsis Uhler, Bull. U. S. Geol. and Geog. Surv., III, p. 466, 1877.
Bythoscopus Germ., Silb. Revue, I, 180, 43, 1833.
Pediopsis Burm., Genera Ins., I, plate 10, 1846.
Agallia Curtis, Ent. Mag., I, p. 193, 1833.

Macropsis has not yet been reported from this country; the other genera are well represented here. Mr. Uhler's description of *Pachyopsis* passes without notice several important points, rendering its arrangement in a synoptic table quite impracticable without an example for direct comparison, which unfortunately I do not possess; but its position would seem to be near *Macropsis*. For the determination of the other five genera the synoptic scheme used by Mr. Edwards in his *Synopsis of the British Cicadinæ* will probably be found as convenient as any yet published. To make it more accessible to our American collectors it is copied here: *

* Since the above was written Mr. Ashmead has published a generic synopsis of the *Bythoscopidæ* practically the same as that of Mr. Edwards except that he includes *Pachyopsis* of Uhler, placing it near *Idiocerus*. See Ent. Am., V, p. 125, July 1889.

1 (6) Antennæ inserted in a deep cavity beneath a ledge.
2 (5) Striation of the pronotum transverse.
3 (4) Side margins of the pronotum sharply keeled, of moderate length..... **Macropsis**
4 (3) Side margins of the pronotum not sharply keeled, very short, ..**Bythoscopus***
5 (2) Striation of the pronotum running obliquely from the middle of its front margin to its hinder angles.....**Pediopsis**
6 (1) Antennæ inserted in a feeble cavity, their base free.
7 (8) Head with the eyes wider than the elytra at the base, membrane with an appendix..... ..... **Idiocerus**
8 (7) Head with the eyes as wide as the elytra at the base, no appendix to the membrane..... .....**Agallia**

In some of the genera the marginal nerve of the wing is continued around the apex and joins the first radial near its middle, thus forming an exterior apical cell, called by Fieber the "supernumerary cell." This cell is present in *Macropsis*, *Idiocerus* and *Agallia*, and absent in *Bythoscopus* and *Pediopsis*. Strangely enough, Fieber, in his *Europæische Bythoscopida*, states the presence of this cell in genus *Bythoscopus* in which it does not exist, and its absence in *Agallia* where it is present. The same error is repeated in his *Cicadines d'Europa*. I have examined a number of European species of each of these genera, received from M. Lethierry, and they agree with the American forms in differing from Fieber's positive statement. But Fieber is not the only one who has erred on this point, for as late as 1884 Mayr, in his *Tabellen*, has reversed these two genera exactly as Fieber did before him. If these later papers are not mere compilations from Fieber's synopsis of 1868 these discrepancies are quite inexplicable to me.

Of the genus *Agallia* two species have thus far been described from this country:

Agallia sanguinolenta.

Bythoscopus sanguinolentus Prov. Naturaliste Canadien, vol. IV, p. 376, 1872.

Bythoscopus siccifolius Uhler, Bull. U. S. Geol. and Geog. Surv., vol. II, p. 359, 1876. Wheeler's Rept. of the Chief of Eng. for 1877, p. 1334. Van Duzee, Can. Ent., vol. XXI, p. 9, 1889 (*Agallia*).

Through the kindness of M. Provancher I have had the pleasure of examining a typical example of his species and have thus been able to compare it directly with Mr. Uhler's description, and find that it agrees in every particular. It is not an uncommon species here on grass and weeds in pastures and roadsides, especially where *Carex* and *Juncus* abound.

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* The striation of the pronotum in this genus is not strictly transverse, but toward the anterior margin especially it is quite oblique; thus approaching some forms of *Pediopsis*. Dr. Fitch has described six species under *Athysanus*.

Agallia quadripunctata.

Bythoscopus 4-punctatus Prov. Nat. Can., IV, 376, 1872.

Agallia flaccida Uhl., Van Duzee, Can. Ent., vol. XXI, p. 9, 1889.

This species I have received in exchange from a number of correspondents as *Agallia flaccida* Uhler, and have so used the name myself in exchanging and in the *List of Muskoka Hemiptera*. It seems to have been an early manuscript name of Mr. Uhler. I append a translation of M. Provancher's description, as the periodical in which it occurs seems to be rare and difficult to obtain. For the copy in my possession I am indebted to the kindness of its editor.

"**Bythoscopus 4-punctatus,** 4-pointed *Bythoscopus*, n. sp.

"Length, .12 inch. Of a yellowish brown, more or less obscure. Head varied "with yellow and brown, with two black points on the anterior margin. Prothorax "with two large black points almost on the posterior margin, in line with those of the "head; other less distinct black points sometimes appear in advance of these. "Elytra soiled yellow, the nerves paler. Beneath brown; feet yellowish. Common. "Very near the preceding (*By. sanguinolentus*) but easily distinguished however by "the presence of the two black points on the posterior margin of the prothorax."

This is a very abundant species in Western New York from early in May until September, and in fact the year round, as it appears to hybernate in the adult state as do many if not all the *Jassidæ*.

GENUS **PEDIOPSIS** Burm.

Head entirely or almost entirely deflexed, viewed from above forming a narrow margin to the front of the prothorax; vertex confounded with the front, with the eyes, as wide as the pronotum. Ocelli on the face about opposite the middle of the eyes, from which they are less distant than from each other. A more or less obvious depression crosses the middle of the face a little above the ocelli. Front bounded by a slight depression, not quite reaching the line of the ocelli. A sharp oblique ridge from the outer angle of the eye to near the base of the clypeus, shielding the base of the antenna. Loræ prominent, tumid. Outer cheeks narrow below, where they are largely covered by the loræ. Clypeus oblong or ovate, usually with a lateral depression before the loræ that sometimes extends across the apex. Rostrum short, scarcely attaining the base of the intermediate femora; composed of three joints, the basal hidden beneath the clypeus. Pronotum short and broad, triangular before, sides very short, latero-posterior angles rounded; posterior margin broadly, sometimes angularly, concave. Scutellum broad-triangular, transversely depressed before the apex, which is sub-acute; slightly calloused within the basal angles. Elytra thin or membranaceous, costa more or less arquated, apex rounded, inner margin straight; membrane without an appendix. Ordinarily there are six closed cells on the

corium, one basal, two discal, and three ante-apical. Membrane composed of the five apical areoles. One or more additional nerves sometimes appear on the disk of the corium. Clavus with two simple parallel nerves terminating on the sutural margin. Wings very delicate membranaceous; abdominal area large; costa slightly concave; supernumerary cell wanting; first radial simple; second radial forked before the apex, each of these forks is connected by a delicate transverse nerve to the adjacent radial, forming three apical areoles; the two remaining radials simple; a marginal nerve running near and parallel to the outer edge of the wing connects all these radials and their branches. Tarsi three-jointed, the basal joint of the hind pair almost as long as the second and third united. Abdomen short, laterally compressed, showing seven segments above and six beneath; ventral segments after the first much depressed within the connexivum; fifth, or ventral plate, in the male sub-cylindric, slightly emarginate at the apex; in the female flat, obtusely triangular and distinctly emarginate at the apex. The form of this ventral plate in the female, which in *Bythoscopus* differs in the various species and forms excellent specific characters, in *Pediopsis* is scarcely variable and is of little help in discriminating the species. The characters of the genitalia do not differ materially from those of the family; in the male the valve is wanting, the plates are broad and hooked above, the styles are ligulate, curved upward toward the apex, and fringed within with long hairs.

The striation of the pronotum radiates from a central smooth line obliquely towards the posterior angles. In some species these rugæ are very prominent, in others feeble and broken up into coalescing punctures; the same form of sculpture is found on the upper part of the face, but here it is less distinct; the central smooth line is generally discernable as far as the frontal suture. In the male the clypeus and loræ are widened and somewhat swollen, obscuring the sutures and giving a square appearance to the lower part of the face. Two styles of elytral marking may be noted: unicolorous or obscurely clouded elytra, *viridis*, *basalis* and *punctifrons*; transversely banded or maculated elytra, *trimaculata*, *bifasciata*, *flavescens*, *insignis* and *ferrugineoides*; the latter form does not seem to be represented in Europe, or but feebly in *cerea* etc. *P. viridis* as here defined seems to combine the characters of the European group represented by *virescens*, and that represented by *cerea*, *glandacea*, &c., the former by the ♀ *viridis*, the latter by the ♂; the European *cerea*, &c., exhibit a black dot on the propleura and on the outside of the posterior tibia at their base, the former only of which is present in the American species. *P. punctifrons* is the only American representative known to me of the spotted-faced series that is so largely

represented in England and on the Continent, but it is not unlikely that other examples will yet be added from the Pacific Coast region where the faunal peculiarities resemble those of Europe much more closely than the Atlantic region. As a rule our species are a little larger than the corresponding European forms, and the pronotal striation is less distinct.

I am placed under renewed obligations to Mr. P. R. Uhler for the loan of very valuable material in this genus and in *Bythoscopus* without which the present studies would have been much more imperfect.

The following synoptic key to our described species I have prepared simply as an aid to determination. It is purely artificial and does not pretend to exhibit to any extent the natural relationship existing between the species. The value of the black dot on the propleura as a specific or even a sexual character is perhaps somewhat questionable, but as it is practically uniform in all the species before me, and a convenient character, I have ventured to make use of it, trusting to future observations to prove or disprove its utility.

SYNOPTIC TABLE.

1 (16) Face unspotted.
2 (7) Elytra hyaline or more or less obscured, not transversely banded or maculated toward the apex.
3 (6) Propleura without a black spot.
4 (5) Entire insect green; elytra hyaline, nerves green.....1. **viridis** ♀
5 (4) Ferruginous; elytra hyaline or nearly so, with a piceous band on the base of the clavus.....2. **basalis**
6 (9) Propleura with a black spot. Color dull green or brown, elytra smoky, at least on the apex and inner margin.....1. **viridis** ♂
7 (2) Elytra colored, more or less distinctly banded or spotted with hyaline, at least toward the apex.
8 (15) Propleura with a black spot.
9 (10) Ferruginous; clypeus short and broad, loræ inconspicuous; size large.....3. **ferrugineoides**
10 (9) Brown or brownish, at least above, or pale yellow; clypeus of medium length or long, loræ conspicuous (except in *trimaculata*).
11 (12) Rugæ very prominent; clypeus long and narrow, ventral plate of ♀ distinctly convex, elytra brown with a pale point on the disk....4. **insignis**
12 (11) Rugæ not very prominent; clypeus broad, impressed beyond the loræ; ventral plate of ♀ flat.
13 (14) Beneath and legs dark brown or black; elytra brown trimaculate with pale..5. **trimaculata**
14 (13) Beneath and legs pale; elytra whitish hyaline bifasciate with brown.....6. **bifasciata**
15 (8) Propleura without a black spot. Yellow, elytra bifasciate with brown.....7. **flavescens**
16 (1) Face spotted. Insect pale green; elytra hyaline, nerves fuscous or at least tinged with brownish.....8. **punctifrons**

1. **Pediopsis viridis** Fitch, Homop. of the N. Y. State Cabinet, p. 59, (1851). Walker, List of Homop., IV, p. 1162, (1852), [*Bythoscopus*]. Uhler, Bull. U. S. Geol. and Geog. Surv., III, p. 467, (1876). Van Duzee, Can. Ent., XXI, p. 9, (1889).

Female.—Uniform pea-green or yellowish-green, generally fading to a yellowish color in the dried specimens. Legs and beneath paler. Face finely punctured below, the rugæ above indistinct, frontal sutures conspicuous; clypeus long, extending for half its length beyond the loræ; eyes brown. Rostrum yellowish green, tip black. Pronotal rugæ feeble. Elytra greenish hyaline, rarely very faintly obscured toward the apex; nerves green, pale toward the tip. Wings very delicate whitish hyaline. Claws and an annulus of small teeth at the tip of the posterior tibia black.

Male.—Obscure green or brown; face and scutellum paler; elytra brown, at least on the apex and inner margin. Facial punctures and frontal rugæ rather more distinct than in the female. Scutellum finely and obscurely punctured. Propleura with a black spot. Beneath pale yellowish brown or honey-yellow with the venter fulvous, in brown examples; or yellowish green with the venter pale, in green examples. Tarsi black or more often only tipped with black. Elytra varying from pale green with a smoky cloud on the apex and inner margin to uniform deep smoky brown. Wings faintly embrowned toward their apex or along their entire outer margin; nervules brown, conspicuous. Tergum greenish or ferruginous, more or less invaded with black, or the disk entirely black with the segments narrowly margined with pale.

Length, ♂, 4½—5 mm.; ♀, 5—6 mm.

The individual variation here encountered is considerable and of a very puzzling nature, and I do not feel fully satisfied that I have rightly defined the species here. Among 86 examples (47 ♂♂ and 39 ♀♀), now before me, 43 males agree in being of some shade of green or brown with the elytra more or less smoky, and with a black spot on the propleura; of the females 37 agree in being of a uniform green of some shade with at most but a faint trace of brown at the apex of the elytra, and without a black spot on the propleura. I feel confident that the variation from green to brown in the males, and from yellowish to deep green in the females is not always or entirely dependant on the maturity of the individual. Of the six anomalous examples before me three males correspond very closely with the females in color, while two females mimic the males; this induced me formerly to consider them distinct species, but as the brown males and green females occur together in great numbers on the same willow bush both as young and adult, and with the entire absence of the similarly colored examples of the opposite sex, it seems necessary to unite them although I have not yet found them pairing.

This is by far our most abundant species of *Pediopsis* in Western New York. It lives on Willow and reaches maturity about the 20th of June, continuing abundant until August. I have also taken it at Muskoka Lake. Mr. Uhler records it from Colorado and has sent me an

example labeled "Md., June 18th, on Willow," and two small brown males from Nevada.

2. **Pediopsis basalis,** n. sp.

Form of *P. nassata* Germ. Ferruginous; abdomen olive green; elytra pellucid, slightly clouded at base and apex, a dark piceous band on the base bordering the scutellum. Length, 5 mm., ♀.

Head pale below; face finely and obscurely punctured, above with the central smooth line and radiating rugæ almost obsolete; eyes and ocelli black. Pronotum finely wrinkled; central smooth line nearly obsolete; posterior edge broadly, not angularly, concave. Scutellum finely punctured, darker at the basal angles. Elytra thickened and distinctly wrinkled on the base of the clavus, which is marked with a broad piceous band contiguous to the scutellar margin; base of the corium and apex broadly suffused with pale yellowish brown. Abdomen dirty olive green, the edge of the segments paler. Valves yellow, tipped with green. Tip of the tarsi brownish.

Described from a single female specimen, taken near Muskoka Lake, about the first of August, 1888. This large distinctly marked form can not be confounded with any other described species.

3. **Pediopsis ferrugineoides** n. sp.

Form broad and stout. Color ferruginous, lower half of the face and all beneath yellow, apex of the elytra and a transverse band beyond the middle subhyaline; propleura with a black spot. Length, 5½—6 mm., width of pronotum about 2 mm.

Vertex viewed from above very narrow; face broad and short, with coarse, shallow, not very distinct rugæ and punctures; frontal suture almost obsolete; loræ narrow, inconspicuous, quite widely margined by the cheeks; clypeus broad and short, scarcely projecting beyond the loræ, surface broadly impressed before the tip which is rounded, base tumid with a central depression; tip of the rostrum black. Pronotum darker on the disk; an elongated yellow spot behind the eye, more or less distinct, and a trace of the same color at the apex; rugæ distinct but not conspicuous; posterior margin rather deeply concave. Scutellum coarsely punctured with five yellow spots, two placed within the basal angles, two smaller ones on the middle of the lateral margins, and an abbreviated longitudinal line on the middle of the base; apex yellowish. Legs pale yellow. Abdomen bright fulvous, the venter paler. Elytra ferruginous, paler towards the apex; a transverse band near the tip of the clavus and the apex more or less distinctly subhyaline, the included ferruginous band may be reduced to a spot on the apex of the sutural margin by the costal coalescence of the clear bands, veins concolorous. Wings milky transparent, veins white.

Montana. Two examples, both females, received from Mr. Uhler. One, a pale individual, evidently immature, exhibits but traces of the yellow markings on the pronotum and scutellum. This is the largest species of *Pediopsis* that has come under my observation. It is well distinguished from all our other species by its short tumid clypeus and depressed loræ.

4. **Pediopsis insignis** n. sp.

Dull yellowish brown ♀, or blackish brown ♂; covered with a white bloom when fresh; elytra with a small pale spot beyond the middle; pronotal rugæ very distinct. Length, ♂, 4 mm.; ♀, 4½—5 mm.

Female.—Color, yellowish brown; superior tip and sometimes the apex of the face darker; tip of the rostrum and claws black. Face coarsely and evenly punctured, rugæ distinct above, sutures of the front almost obsolete; loræ prominent, tumid, paler than the face; clypeus narrow, convex, sides scarcely depressed beyond the loræ. Ventral plate broad and rather short, disk distinctly convex, apex with a deep notch. All the pleural pecies with a central black spot, that of the mesopleura much the largest. Pronotum pale yellowish brown; a large dusky patch on the disk almost reaching the anterior margin in the middle, with a curved extension on each side along the hind edge nearly to the humeral angles; rugæ very distinct and oblique over the entire surface; posterior margin deeply arquated. Scutellum pale brown, the basal angles and sometimes the apex with a dusky spot. Elytra uniform pale brown, or slightly paler near the apex of the costa; nervures pale, a small pale spot on the base of the two inner ante-apical cells. Abdomen more or less tinged with ferruginous, the posterior margin of the segments narrowly pale; valves sometimes dusky. Wings smoky hyaline, nervures fuscous. Legs concolorous with the abdomen, the tibiæ darker.

Male.—Blackish brown, elytral nervures scarcely paler; black areas much extended, especially on the abdomen which may be entirely black, with the margins of the segments pale; otherwise like the female.

Many examples taken at Lancaster, N. Y., July 9th, 1889, on low bushes of Wild Plum. One ♀, taken at Madison, Kan., by my brother, M. C. Van Duzee, only differs from the eastern examples in the slightly darker color and abbreviated elytra which reach only to the tip of the abdomen. Superficially this resembles the *trimaculata* but differs from it and from all our other species by the form of the clypeus and ventral plate and by the conspicuous striation of the pronotum, approaching in this respect the European species.

5. **Pediopsis trimaculata** Fitch. Homop. N. Y. State Cab., p. 60, 1851.

Dr. Fitch's description of this species is as follows:

"Dull brown; scutel with a black spot at each angle, the posterior one some-
"times obsolete; elytra with pellucid white spots, situated, one on the apex, one on
"the disk, and a third anteriorly; scutellar region obscure cinereous; face whitish.
"Length, .18 inch. No. 785, ♀."

On the 4th of July, 1885, I took at Colden, N. Y., a single female of this species of which the following is a description:

Form short and robust. Color soiled yellowish brown, face and scutel paler. Apex of the clypeus and coxæ, knees, tarsi, penultimate joint of the rostrum before, margin of the mesosternum, and the venter pale yellowish. Facial rugæ distinct; front rather coarsely punctured. Outer cheeks and pleural pecies black. Antennæ and spines of the posterior tibiæ pale. Valves dusky on the sides. Basal angles of the scutel black. Elytra reaching the tip of the abdomen; clavus deep brown; corium pale grayish white, a large patch near the middle scarcely reaching the claval suture, and extending along the costa to the shoulder, and a transverse band before the apex brown. Length, 5½ mm.

The elytra are of an unusually thick, almost coriaceous texture, with the surface more distinctly wrinkled than in our other species; possibly they are variable in length as in *insignis*. This is probably a rare species.

6. **Pediopsis bifasciata** n. sp.

Brownish ferruginous, pale beneath. Elytra whitish hyaline bifasciate with fuscous. Length, 5½ mm.

Face finely and obscurely punctured; clypeus pale yellowish, broadly depressed and smooth at the apex, clothed with scattering minute hairs; loræ conspicuous, almost concealing the lower part of the cheeks; rostrum rather long, tip black; eyes black. Pronotum finely wrinkled, darker on the disk, the posterior margin narrowly pale; lateral margin rather long with a black spot between the eye and the base of the elytra. Angles of the scutellum darker. Beneath pale honey yellow; pleural pecies and femora, except at base, tinged with ferruginous. Propleura with a black spot. Claws and metanotum black. Tergum yellowish brown, darker toward the apex. Elytra whitish hyaline with a transverse fuscous band, displaced on the claval suture, crossing near their middle, and another just before their apex; nervures concolorous. Wings hyaline, nervures pale fuscous.

The amount of fuscous on the elytra is perhaps subject to variation. In the present example the hyaline surface slightly exceeds the fuscous, and the space between the fuscous bands has a clearer whitish aspect. Described from one ♀ taken at Muskoka Lake the last of July 1888.

This species bears a certain resemblance to the *trimaculata* of Fitch, but it is larger and stouter, the lower surface and legs are pale, the sculpturing of the head and thorax is much finer, and the elytra are differently marked.

7. **Pediopsis flavescens** Prov. Naturaliste Canadien, IV, p. 376, 1872.

Pale yellowish or greenish yellow; abdomen fulvous; elytra with two transverse brown bands. Length, 4½ mm., ♀.

Head, pronotum and scutellum pale yellow or greenish yellow, finely punctured. Clypeus broad, not tumid, the submargin depressed before the loræ, the apex broadly rounded. Eyes brown. Posterior margin of the pronotum rather deeply concave, the rugæ indistinct. Elytra whitish hyaline, obscurely washed with yellowish at the base, with two broad pale brown transverse bands, one near the middle, the other on the apex but omitting the extreme tip. Abdomen fulvous, edges of the dorsal segments, inner margin of the valves, and ventral plate sometimes whitish. Legs pale whitish yellow.

Two examples; Muskoka, Ont., July 1888, and Lancaster, N. Y., June 27th 1889. This species most nearly resembles the preceding but they are sufficiently distinct.

It is not without misgivings that I refer this insect to M. Provancher's species. It is larger than he indicates, is not "washed with brown on the thorax," and the elytral bands are more distinct; but this character is, I think, liable to vary, and the two former could be reconciled by assuming that he drew up his description from a male. With our present meagre knowledge of the North American *Bythoscopidæ* an erroneous determination seems preferable to the possible creation of a new synonym. The following translation of M. Provancher's description will afford a ready means of comparison should more promising material be procured later.

"Length, .12 inch. Yellowish ; thorax washed with brownish ; elytra hyaline, washed with yellowish at the base, carrying near the middle and at the apex ill defined, more or less apparent spots. Vertex narrow, slightly triangular before the same as the front of the prothorax. Elytra longer than the body. Beneath and feet also yellow."

8. **Pediopsis punctifrons** Uhl. MS.

Similar in form to *P. scutellata* but smaller. Pale or yellowish green ; face and scutel with black spots ; elytra hyaline with brown nervures. Length, $3\frac{1}{2}$—4 mm., width, about $1\frac{1}{2}$ mm.

Male.—Head broad, less angular before than in *viridis*. Face with distinct but shallow punctures and wrinkles, these broken and somewhat obscure on the front ; frontal sutures distinct ; loræ of medium width, scarcely tumid ; clypeus broad, the sides rounded, with a slight depression beyond the loræ. In fully colored examples there are fine black spots on the face ; one above near the tip, another on each side directly above the ocellus, and two comma-shaped spots facing each other on the upper part of the front. Ocelli brown. Eyes pale. Tip of the rostrum black. Propleura with a black spot. Legs and all beneath pale green. Pronotum with distinct rugæ ; anterior margin quite strongly depressed each side of the center behind the eyes where there is a row of four or five impressed black points, or a black line ; disk sometimes suffused with brownish. Scutellum pale with a broad black central longitudinal line, widened toward the apex where it is divided by a slender pale line ; in pale examples this line is broken into three small spots arranged in a triangle ; each side of this central line and immediately before the transverse depression is a round black point ; and within the basal angles are triangular black spots. Elytra hyaline, greenish at the base, the nervures brown ; generally there are one or more extra transverse nervures in the anti-apical cells. Wings transparent with brownish veins. Tergum yellowish green.

The female differs from the male in being paler, with the elytral nervures greenish or but slightly embrowned, and in having the black spots much reduced or some of them wanting. The round black points on each side of the vertex and disk of the scutellum are the last to be effected and are probably never entirely absent.

Arizona. Collected by the late Mr. H. K. Morrison. Described from seven examples ; four received from Mr. Uhler and three from the Cornell University collection.

A little lot of *Callimorpha contigua* is now feeding on *Rubus* and *Rosa*. To the kindness of Mr. Schœnborn I owe the eggs, taken from several captured females all exactly alike, as I had an opportunity of seeing. I tried the young larva on Plantain and several others of the ordinary *Arctiid* food plants, but they refused everything but a leaf of Black-cap Raspberry which got in by accident. They will eat also Blackberry and Rose, but took nothing else.

CONTRIBUTIONS TOWARD A MONOGRAPH OF THE NOCTUIDÆ OF NORTH AMERICA.

REVISION OF THE SPECIES OF PSEUDANARTA.*

By John B. Smith.

Genus **PSEUDANARTA** Hy. Edw.
Proc. Cal. Ac. Sci., vol. 6, p. 133, 1875.

Plump, rather robust species of small or medium size. Eyes naked with a distinct fringe of hair or "lashed"—less distinct in *singula*, very heavy in *flavidens* and obvious in *flava*. The head is small, closely applied to the thorax but scarcely sunken. Eyes small, prominent, round. Frontal vestiture scaly, divergent, forming superimposed tufts. Palpi distinct, somewhat divergent, moderate in size, the vestiture rather loose. Tongue long and strong. Antennæ simply and finely ciliate in the male, entirely smooth in the female. Thorax quadrate, vestiture coarse, consisting of a mixture of scales and flattened hairs, forming an anterior divided crest, and a distinct posterior tuft. Patagiæ somewhat uplifted and well defined. Collar marked. Legs short and stout, the spurs of middle and hind tibiæ moderate or rather short, else unarmed; rather densely clothed with long and fine hair. Abdomen somewhat exceeding secondaries, conic, with a row of small, truncate dorsal tufts, and in the male a series of small lateral tufts. Wings proportionate; primaries trigonate, in *falcata* the apices somewhat marked, outer margin bulging medially—in the other species the apices rectangular or somewhat more defined, the outer margin even and rounded obliquely; the fringes are very slightly nicked. Secondaries proportionate, the outer margins even. The coloration of the secondaries is peculiar to the genus—they are yellow, with distinct black outer border, mimicing some species of *Anarta*, which indeed they somewhat resemble in habitus.

The genitalia of the two species examined are not particularly alike and will be especially described with the species.

The genus is scarcely a well defined one, and the species were mostly described as *Hadena*. Mr. Edwards based his genus on the habitus and color, and Mr. Grote adopts it as a rather doubtful division of *Hadena*. The distinctly lashed eyes form perhaps the most distinguishing feature of the genus. The yellow secondaries form a very good superficial distinctive charater.

* For introduction to this series see Ento. Amer., V, p. 105. The figures to this paper will appear in a following number.

The species are readily distinguishable. Two of them are unknown to me but apparently distinct enough from the descriptions.

Falcata Neumœgen, is said to have the primaries somewhat falcate —an obvious distinction, for none of the other species have any approach to this. The generic reference may be inaccurate. It is compared by its describer to *P. flava.*

Aurea Grote, is a very small species, smaller than *flava*, with very dark primaries, the reniform white and contrasting. The secondaries have the black margin to primaries narrow, and have also the costal margin black—a somewhat distinctive feature.

Flava Grote, is also a small species with more brownish primaries with narrow white lines emphasizing the maculation, the median lines variably separated, and with a usually somewhat faint connecting line.

Singula Grote, is decidedly larger and very distinctly marked. The median lines are very distinctly connected by a black dash and there is an oblique, black, sub-apical shade. The t. p. line has a distinct though not prominent outward tooth over reniform.

Flavidens Grote, is still larger and is the largest species of the genus. The median lines are very even, somewhat approximate and with a very faint connecting line, often entirely wanting. A whitish shade accompanies the t. p. line, and there is a very distinct median shade line through the outer portion of median space, which is found in none of the other species.

In tabular form the scheme is as follows:

Primaries with marked apices, sub-falcate ..... **falcata**
Primaries with rectangular or rounded apices.
  Size very small; reniform contrasting, white, color dark; secondaries with costal margin black ..... **aurea**
  Size small; reniform not contrasting, color more brownish, costal margins of secondaries not black ..... **flava**
  Size larger, moderate.
    Median lines well separated; distinctly connected by a black dash on submedian fold. No distinct median shade line ..... **singula**
    Median lines more approximate, even; no distinct connecting line; a very distinct median shade line ..... **flavidens**

P. falcata Naum. Papilio, 3, 141, 1883.

Antennæ, head, thorax and abdomen light brown, with anal tuft of a lighter shade. Underside of abdomen and legs of the same lighter shade. Primaries very pointed at apex, then considerably bulging out along exterior margin, and rounding off at inner angle. Color of same a light brown. A light transverse line from near apex to inner margin; the space enclosed between the same and exterior margin of a lighter shade, darkening along the latter and showing faintly a marginal line of irregular dots from apex to inner angle. Another faint, oblique line from costa near base to middle of interior margin, nearly joining there the anterior transverse line. A faint whitish reniform discal ring, having a larger, oblong anterior companion ring. Fringes light brown.

Secondaries and fringes bright yellow, immaculate, with a distinct broad black marginal band from costa to anal angle. Beneath, primaries, bright yellow, slightly dusted with brown grains along costa. A broad black transverse marginal band covering nearly one-third of the wing. Secondaries bright yellow, slightly dusted with brown along costa. The same broad black marginal band as on upper surface. A small black discal spot.

Expanse of wings, 20 mm. Length of body, 8 mm.

Habitat—Ft. Huachuca, Arizona (Morrison). Type, ♂. Coll., B. Neumœgen.

The only representative of its tribe with falcate wings so far known, nearing otherwise in appearance *A. flava.*

The species is autoptically unknown to me, and the above is Mr. Neumœgen's original description. The wing form is so unlike the other species, as to suggest a doubt of the generic reference.

P. aurea Grt. Bull. Surv., 5, 205; Can. Ent., 14, 19, 1882.

"♂ smaller than *H. flava.* Fore wings dark blackish brown, darker from the arcuate single t. a. line over the anterior half of the median space. Reniform pale, whitish, spherical, standing out, the only prominent feature of the dark primaries, repeated beneath, fringes concolorous. The wing is palest about the reniform and over subterminal space. Hind wings orange yellow with broad even black costal terminal border; beneath as above. Body parts blackish. This species is remarkable for the similarity between the upper and lower surfaces of the wings.

Habitat—Southern Texas, Prof. J. A. Lintner."

"Very different from *flava,* by the black costal border of the orange secondaries and the narrower and more even hind border."

The above is Mr. Grote's original description. I have seen nothing to accord with it thus far. It is also recorded from Arizona.

P. flava Grt. Trans. Am. Ent. Soc., 1874, v. 5, p. 91, *Hadena*; Bull. Surv. 4, 178, *Pseudanarta.*

crocea Hy. Edw. Pr. Cal. Ac. Sci., 1875, v. 6, p. 133, *Pseudanarta*; Grt. Bull. Surv., v. 6, p. 265, pr. var.; Can. Ent., 12, 215, 1880, pr. var.

Head, thorax and primaries blackish fuscous. Patagiæ black margined and white tipped. Collar also pale tipped. Primaries with a brown suffusion through median space. Basal half line geminate, distinct. A short black dash at base and another on internal margin—variably defined and sometimes wanting. T. a. line distinctly geminate, included space bluish white; the line outwardly curved, and angulated, most distinctly in the sub-median interspace. T. p. line geminate outwardly curved over reniform then parallel with outer margin and somewhat sinuate to the internal margin. The inner line distinctly black, included space bluish white. Beyond this line is a bluish white shade extending to the s. t. line, and through the centre of which is a more or less distinct brownish shade most marked on costa. S. t. line pale irregular, more or less marked with blackish preceding spots. A narrow more or less distinct black line through sub-median interspace connects the median lines, which are very variable distances apart. Orbicular concolorous, oblique, narrowly white ringed somewhat varying in shape. Reniform upright elongate, constricted centrally, narrowly white ringed, also variable in shape.

Secondaries yellow. with black borders. Beneath both wings very pale yellow powdered with blackish, with black outer border, and with a small blackish discal spot.

Expands, .80—1.00 inch., 23—25 mm.

Habitat—Or., Br. Col., Col., Nev., Ariz., Texas (?).

A rather variable species, yet readily recognizable.

The reach of variation, and the characters separating *crocea* are thus given by Mr. Grote: "This form only differs from the typical *flava* from British Columbia by the primaries above being shaded with pale, especially on the disc, and being more yellowish, beneath at base, contrasting with the black border. These colorational characters do not seem to be constant, for in one specimen from Oregon the pale shading is confined to a space about the reniform, and in a still paler *crocea*, from Colorado the contrast between the yellow base and the black terminal band is not as great as usual. I think *crocea* is a variety of *flava*. In both the exterior line is outwardly bent over the median nervules and followed by a whitish and then a brown shade."

From the material at my command I would refer *crocea* as a synonym rather than a variety of *flava*. There is no possible line between the two, geographical or otherwise.

P. singula Grt. Can. Ent., 12, 215, 1880, *Pseudanarta*.

Head, thorax and primaries blackish fuscous, varying to dark gray. Thorax with the patagiæ black edged. Primaries with the maculation distinct. Basal half line variably distinct, but always visible, geminate, arquate. A black longitudinal dash, somewhat varying in length—a black mark along inner margin, also somewhat variable in extent. T. a. line geminate, inner line usually faint, the outer black; outwardly curved and bent, and with a longer outward angle on the internal vein. T. p. line bent over reniform and well removed from it, decidedly angulate opposite the inferior portion, thence with a slight inward curve and somewhat tremulous to hind margin. The line is geminate, the inner portion black and sharply defined, the outer more or less obsolete. Beyond the t. p. line a paler shade prevails, gradually darkening to the outer margin. S. t. line paler, faint, irregular. An oblique black shade, consisting of two black diffuse dashes, extends from below apex nearly to t. p. line at its angulation beyond the cell. A broad black mark connects the median lines below the median veins. Orbicular large, oblique, ovate, slightly paler, black ringed. Reniform large, upright slightly constricted medially, somewhat paler, rather indefinitely outlined. Beyond the reniform and close to and parallel with the t. p. line is a narrow black shade line indistinct towards costa, but distinct below reniform to the internal margin. Secondaries yellow, with a broad black outer margin. Beneath primaries very pale yellow, powdered with black and with a broad black margin. Secondaries as above.

Expands, 1.00—1.12 inches, 25—28 mm.

Habitat—Texas, Arizona.

A broader winged and larger species than *flava* and very distinct from it in markings. The large ordinary spots and the oblique black shade below the apex are characteristic.

This is the species recorded by Mr. Morrison as *flava* from Texas, and it is therefore doubtful whether *flava* really occurs there—as *singula* extends to Arizona however, where *flava* is also found, the latter may well be an inhabitant of Texas.

The harpes of the male are very long and narrow, terminating in a somewhat acute tip. The clasper is corneous, long, stout, rather abruptly bent and suddenly narrowing toward tip, terminating in a short beak-like point.

P. flavidens Grt. Bull. Surv., 5, 205, *Pseudanarta.*

Head, thorax and primaries dark ashen or blackish fuscous. Thorax sprinkled with black and gray, the patagiæ black margined. Primaries with median space darker, s. t. space decidedly grayish and paler than the rest of the wing. Basal space somewhat evenly dark gray with a small brown spot near t. a. line. Basal half line geminate, distinct, black. T. a. line very even, curved outwardly, distinctly geminate, the inner line fainter, the outer black. T. p. line geminate, very even, fine, outwardly curved over reniform which the line touches inferiorly, then obliquely incurved to the internal margin. A pale shade beyond reniform through the s. t. space, gradually darkening to the terminal space which is evenly dark, relieving the very irregular pale s. t. line. Orbicular large, oblique, narrowly black ringed grayish powdered. Reniform large upright pale ringed, and with a pale central line. A very distinct black shade line from costa, close to reniform, and between it and orbicular, then parallel with and close to t. p. line to the internal margin. Secondaries orange yellow, with a broad black outer border, costa narrowly black. Beneath, primaries pale yellow, with a broad black outer margin, the disk suffused with blackish. Secondaries as above, the costal region powdered with deep brick red.

Expands, 1.10—1.20 inches, 27.5—30 mm.

Habitat—Colorado.

This species seems rather common locally, and differs from all the other species first in its larger average size, in the very even median lines, the pale s. t. space, and in the distinct black median shade line.

The genitalia of the male have the harpes moderately wide, the tip rounded and slightly oblique. The clasper is corneous, broad at base, suddenly bent beyond its middle, and then moderately long and distinctly curved—differing thus throughout from *singula* without any definite change of type.

Dr. Horn is studying *Heterocerus* and *Ochthebius.*

* * *

Capt. Casey has in hand a Revision of the *Pæderini.*

* * *

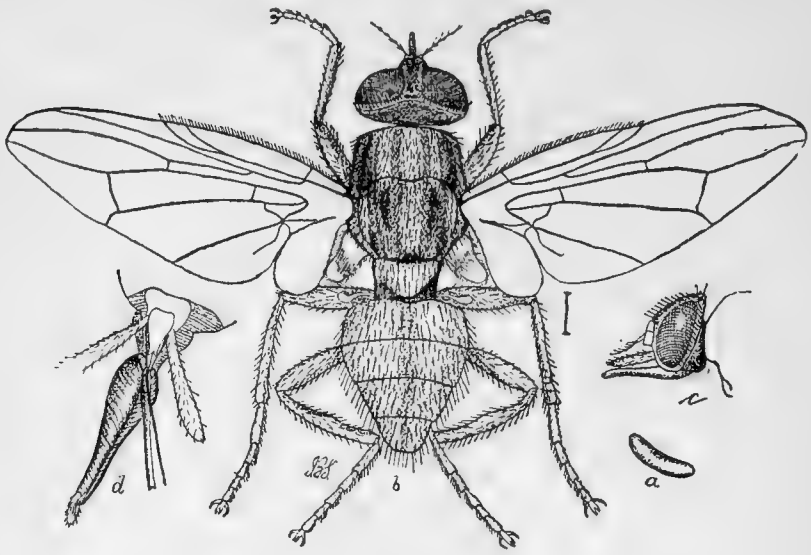
Mr. Roberts is making a very complete collection of water beetles, and promises some results in the *Haliplidæ.*

* * *

"Ye Editor" is getting his Noctuid MS. into shape, and a monograph of *Agrotis* will probably be ready for press early in October.

A New Species of Hæmatobia.

By S. W. Williston, M. D.



HÆMATOBIA CORNICOLA, Will.
a) Egg; b) Imago; c) Head from side; d) Mouth parts.

Hæmatobia cornicola n. sp.

? *H. serrata* Robineau Desvoidy, Myod., 389.—France.

♂. Length, 3½—4 mm. Sides of the front gently concave, in its narrowest width about equal to one-fourth the length of the front from the foremost ocellus to the base of the antennæ; in the middle a narrow, dark brown stripe; a single row of slender bristles on each side. Antennæ brownish red; second joint slightly tumid; third joint a little longer than broad, with its inferior angle rectangular; arista swollen at the base (which is black); the pectinations long. The narrow sides of the front, and the still narrower facial and genial orbits, silvery gray, with a slight yellowish cast; facial foveæ and cheeks blackish, the latter clothed with yellowish hair. Palpi black, the inner surface and immediate base more yellowish; gently spatulate in shape, nearly as long as the proboscis, and extending two-third of their length beyond the oral margin. Mesonotum sub shining black in ground color, but mostly concealed beneath a brownish dust, and with only taint indications of stripes. Dust on the pleuræ more grayish. Abdomen with similar dust; in the middle with a more brownish, sub-interrupted stripe, and narrow dark posterior margins to the segments. Femora black or very deep brown; first two pairs of tibiæ and tarsi brownish yellow or luteous, the hind tibiæ and tarsi blackish brown; hind tibiæ on the posterior surface with noticeable, erect, subapical bristles, hind tarsi about as long as their tibiæ, the first three joints widened from base to tip of each, so as to form a distinct serration on their inner acute angles, each of which terminates in a long hair. Wings with a light blackish tinge (due to microscopic pubescence), the immediate base yellowish; first posterior cell rather symmetrically narrowed to terminate broadly at the extreme tip of the wing.

♀. Front straight on the sides, its width about equal to one-half the distance from the foremost ocellus to the base of the antennæ; the median deep brown stripes about as wide as the lateral pruinose portion. Palpi yellow, with the margins and tip blackish. Legs more yellowish; hind tarsi regular; pulvilli and claws small.

The first specimens of this remarkable fly were sent to me nearly two years ago by Prof. Cope, through Prof. Comstock, and very shortly afterwards by Prof. Riley. More recently I received them from Professors Lintner and Smith. I cannot resist the belief that the species is an introduced one, and suspect that it may be identical with *H. serrata* R. Desv., occuring in France. Aside, however, from the discrepancies that his description shows in the color of the legs, an identification of this author's species is usually, at the best, only a guess. Macquart's very brief description is better, but the palpi are distinctly enlarged, and he says they are not. Nothing but a comparison of the specimens will settle the question. The name *cornicola* was proposed by Prof. Cope.

I separate *Hæmatobia* from *Stomoxys* because I believe the length of the palpi is a sufficient character.

It is never quite safe to say a thing cannot be done, but it strikes the close observer as rather a wild scheme to undertake a study of the relations of the mosquitos and Dragon flies, with a view of breeding the latter to destroy the former. Mr. Lamborn's proposition, made by a circular bearing date July 15th, 1889, offers $200 in three prizes of $150, $30 and $20, for "the three best essays on the destruction of mosquitos and flies by other insects."

The essays must be in by December 1st, 1889. Now here already is an element of impossibility. All who have ever studied any life histories know that one full season of Insect life must elapse before we can speak of a complete history, because number of broods constitutes a very important element in the question mooted by Mr. Lamborn. By the middle of July half the season is over and between July 15th and December 1st it *is* an utter impossibility to make studies resulting in any reliable or practicable suggestions. Yet the "suggestions" made in the circular require study and investigation of the most careful kind which ought to take at least one full year to produce any results at all. We doubt if any entomologist of standing will even contemplate trying for the prize. Then, with all due respect to Dr. Henry McCook, and Dr. J. S. Newberry, they are very far from the best men to choose as judges. It requires entomologists of experience in an economic line to judge of the value of observations and the practicability of methods advocated. Dr. C. V. Riley, Prof. S. A. Forbes, J. A. Lintner, J. H. Comstock or a number of others would have commanded much greater confidence, not because they rank higher as scientists, but because of their special knowledge of raising insects, in studying life habits, and methods of destruction of obnoxious species. We shall look forward with great interest to the result of the studies made to secure the prizes.

NOTES ON THE PÆDERINI.

By Thos. L. Casey.

As preliminary to a revision of our *Pæderini*,* it is desired at the present time to publish a few notes and descriptions in the form of a prodromus.

HOMŒOTARSUS Hochh.

At the time of publication of the description of *Hesperobium* (Bull. Cal. Acad. Sci., II, p. 33), the genus *Homœotarsus* was unknown to me in nature, but within the past year I have received from Herr Reitter of Vienna a perfect male specimen of *H. Chaudoiri*, the type of the genus, and find that our species should be generically associated with it, at least for the present. It is true that there are certain differences of minor value, as for instance in the antennæ, which in the Armenian species have the joints strangulated at base, and the eleventh joint fusiform and gradually pointed at apex. The sexual characters are also different, presenting a form of emargination of the fifth and sixth segments, which is quite foreign to our species. These differences are, however, of a secondary or perhaps subgeneric value, and when the genus is thoroughly investigated the species assigned more particularly to *Hesperobium*, will form one only of a number of subgenera; until that time the name can very well be suppressed.

In the remarkable collection recently made by Mr. H. H. Smith in Brazil, there are several very peculiar species; one, for example, in which the large lobe of the third segment in the male is deeply bilobed, giving the appearance of two well developed lobes, and another large slender species, having unusually long and slender legs, in which the posterior trochanters of the male are prolonged in a slender spine which extends to the apex of the femur, reminding us somewhat of the same part in the Carabide genus *Platidius* of Chaudoir.

The following table indicates the differential characters of the eastern species allied to *pallipes* Grav.

Elytra subequal in length to the prothorax.

Posterior margin of the fifth ventral segment ♂ toothed in the middle; emargination of the sixth segment deeper than wide.....**pallipes**

* In order that this work may be as complete and useful as possible, it is earnestly hoped that those who have material to spare, may consent to its utilization in the proposed revision. In connection with this request it should be suggested, and I think most collectors will readily agree, that it would be far better for the ultimate welfare of Science if unique types could be retained in the cabinet of the reviser. The contributors would, however, in every case receive in return a larger set of carefully determined species than can probably be included in their individual series.

Posterior margin of the fifth segment simple.
Emargination of the sixth segment ♂ as wide as deep.....**capito**
Emargination twice as wide as deep.....**flavicornis**
Elytra much longer than the prothorax ... .**cinctus**

In his original description of *pallipes*, Gravenhorst does not allude in any way to the sexual characters of the male, and his description is perfectly applicable to either *pallipes* or *capito*; the table will therefore serve to establish these species in their mutual relationship. *Cinctus* was, two years after Say's publication, described by Nordmann (Symb. ad Mon. Staph., p. 150), as *Cryptobium latericola*. This was erroneously printed *C. latebricola* by Erichson. and so copied by all the more recent authors, perhaps under the very plausible assumption that *latebricola* is what Nordmann intended to write. *Flavicornis* Lec., is a smaller species with decidedly narrower head; it is rare.

The following new genera are perhaps worthy of description on this occasion:

MEGASTILICUS n. gen.

Body robust, sub-depressed. Head rounded, borne on a very slender neck. Eyes rather small. Antennæ very short, compact, slightly robust, scarcely perceptibly incrassate. Labrum large, broadly emarginate in the middle at apex, the emargination bidentate. Maxillary palpi very small, moderately robust; third joint cylindrical, about twice as long as the second, truncate at apex; fourth joint small, subulate. Legs long and slender; tarsi cylindrical, the anterior not in the least dilated in the male; posterior nearly as long as the tibiæ, with the first four joints decreasing gradually in length, the first shorter than the next two combined and slightly longer than the fifth.

This is a myrmecophilous genus, peculiar in the structure of the maxillary palpi, in this respect having no near allies which I have seen. The body is remarkably robust.

M. formicarius n. sp.

Rufo-ferruginous; head and abdomen piceous; entire upper surface densely granulato-reticulate, rather dull and covered somewhat densely with short erect and very robust spinules; abdomen smoother and not granulate. Head as wide as long, very slightly wider and longer than the prothorax, the latter hexagonal, widest much before the middle, feebly narrowed toward base, the latter transversely truncate. Elytra slightly wider than long, longer than the prothorax and, toward apex, nearly twice as wide. Abdomen short and broad, in the middle slightly wider than the elytra; sides arcuate. Length, 5 mm.

New Jersey; Massachusetts.

The male has the apex of the sixth ventral segment deeply sinuate.

I am indebted for my first specimen of this very singular insect to my friend Mr. W. Jülich, of New York; subsequently I received several others through the kindness of Mr. F. Blanchard, of Lowell, Mass.; whose MS. name I have adopted for the genus.

PLATYMEDON n. gen.

Body robust, depressed, with the sides parallel. Labrum rather short, quadridentate; teeth short. Antennæ moderate in length, slender, not incrassate, the first joint more robust. Eyes moderate. Maxillary palpi rather well developed; third joint very strongly compressed, longer than the second and increasing in width from base to apex; fourth minute, subulate, very strongly compressed. Neck broad. Anterior coxal cavities open behind, the pronotal hypomera widely inflexed behind and acute, becoming rapidly narrower anteriorly. Legs slender, moderate in length; tarsi slender, the posterior elongate, three-fourth as long as the tibiæ, the first four joints decreasing rapidly in length, the first shorter than the next two together and much longer than the fifth.

This is also a myrmecophilous genus, the distinguishing character of which is the very strong compression of the third and fourth joints of the maxillary palpi. It is related to *Medon*.

P. laticollis n. sp.

Rufo-ferruginous throughout; integuments shining, not reticulate, the abdomen subalutaceous and much more densely pubescent; anterior portions very finely and not very densely pubescent. Head wider than long; sides nearly parallel; base broadly, very feebly arcuate; antennæ much shorter than the head and prothorax together. Prothorax as long as the head and slightly wider, one-half wider than long; sides nearly parallel; basal angles broadly rounded. Elytra distinctly wider than long, longer than the prothorax but scarcely perceptibly wider. Abdomen as wide as the elytra, the fifth segment as long as the two preceding together. Length, 4.2 mm.

Nebraska.

The single specimen before me I owe to the kindness of Mr. E. A. Schwarz; it is probably a female.

At the meeting of the Feltman Collecting Social, July 9th, Mr. Laurent gave a description of a very ingenious box for preserving food plants fresh for some time. The size of the box determined on, a rough wooden box, is partly filled with fluid plaster of paris, and another box of the inside dimensions desired is pressed into the pasty mass, the space between the two boxes being then completely filled and the edges made smooth and even. When the plaster has set, the inside box is broken out and the plaster box turned out of the outside casing. For the cover a shallow mold is prepared with a smooth bottom and a flat cover is cast which, if the job is neatly done, will fit tightly upon the plaster box. The plaster will absorb a great deal of water and give it off very slowly, keeping the plants in the box fresh a long time. When dry the box is put under a tap and again charged. Mr. Laurent says he has kept Sassafras fresh for 13 days in such a box. For a man able to get out only once a week, such boxes would prove of immense advantage.

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A GENERIC SYNOPSIS OF THE APHIDIDÆ.

By Wm. H. Ashmead.

Family VIII. APHIDIDÆ.

All soft bodied insects. Head small, longer than wide, and seldom as wide as the thorax; the frons most frequently triangular, flattened, slightly concave or slightly convex, never much produced. Eyes prominent, hemispherical, facetted, with a slight tubercle posteriorly, and situated on the sides of the head, entirely absent only in a few subterranean species. Ocelli 3, small, sometimes indistinct or wanting, 2 situated close to the eye and one on the vertex. Beak 3-jointed, arising at the hinder inferior part of the head, enclosing 3 to 4 fine setæ, when at rest usually pressed close to the sternum in a more or less distinct groove between the coxæ. Antennæ filiform, 3- to 7 jointed, of variable length, sometimes longer than the body. Thorax usually well developed and lobed. Scutellum not large transverse or triangular. Wings when present four, membranous, not strongly veined—a costal, subcostal, discoidal and stigmal veins. Tegulæ present but very small. Coxæ short, conical, gradually increasing in size posteriorly, not contiguous. Femora seldom very thick. Tibiæ usually long, slender, cylindrical. Tarsi short, 2-jointed, except in Oestlund's new genus *Mastopoda*, in which they are atrophied, and one-jointed in two or three subterranean genera; the latter, however, are probably nothing but nymphs. Pulvilli usually present. Abdomen oval, elongate oval or ovoid, the sixth segment dorsally often with distinct honey-tubes or nectaries; in some forms these are subobsolete or tuberculate, or visible only as oval openings, in others they are entirely wanting; they secrete a sweet substance called "honey-dew" of which ants are particularly fond.

At the tip of the abdomen is usually found a more or less distinct appendage, seldom entirely wanting, called the cauda or style.

To both the student and philosopher there is no more interesting family to study than the *Aphididæ*, and connected with their life histories are many scientific problems, that yet remain unsolved.

The females of many of the species are viviparous, although some of these are now known to be merely the dimorphic or seasonable variety of an oviparous form, and some of these *probably* change their food-plant and habitat as often as there are seasons in the year.

The eggs of most of the *Aphididæ* are long oval, but in some of the lower forms they are more or less spherical. Many of the species live in galls, others cover themselves with a wooly or flocculent secretion, while a few secrete a waxy covering for themselves analogous to that produced by the *Coccids*.

The family may be divided into seven subfamilies, recognized by the aid of the following table:

TABLE OF THE SUBFAMILIES.

A—Honey tubes always distinct, often quite long.

Front wings with a double forked cubitus; hind wings with two oblique veins; antennæ 7-jointed.....Subfamily I. **APHIDINÆ**

B—Honey tubes very short, tuberculiform or subobsolete.

Front wings with a double forked cubitus (except in *Amycla* Koch); hind wings with two oblique veins.

Antennæ 7-jointed, the 7th joint setaceous, not rudimentary..... .....
Subfamily II. **CALLIPTERINÆ**

Antennæ 6-jointed, usually with a spur or rudimentary 7th joint.....
Subfamily III. **LACHNINÆ**

C—No honey tubes.

Front wings with cubitus once forked; hind wings with one or two oblique veins.

Antennæ 5- or 6-jointed.....Subfamily IV. **SCHIZONEURINÆ**

Front wings with cubitus not forked; hind wings with one or two oblique veins.

Antennæ 5- or 6-jointed..... .....Subfamily V. **PEMPHIGINÆ**

Front wings with only three veins.

Antennæ 5-jointed; hind wing with a subcostal nerve and an oblique vein..
Subfamily VI. **CHERMESINÆ**

Antennæ 3-jointed; hind wing with a subcostal nerve and no oblique vein...
Subfamily VII. **PHYLLOXERINÆ**

Subfamily I. **APHIDINÆ.**

TABLE OF GENERA.

1 Antennæ not on frontal tubercles.....4

Antennæ on frontal tubercles.

Antennæ not approximate at base; frons not grooved, flat or convex.....2

Antennæ approximate at base; frons grooved.....G. 1. **Siphonophora** Koch

2 First antennal joint with a tooth on the inside .....G. 2. **Phorodon** Pass.

First antennal joint without a tooth on the inside.

Prothorax with lateral tubercles.
Honey tubes long, much dilated in the middle..G. 3. **Macrosiphum** Oestl.
Prothorax without lateral tubercles.
Honey tubes not distinctly clavate or expanded at apex.....3
Honey tubes distinctly clavate.....G. 4. **Rhopalosiphum** Koch
Honey tubes expanded at apex or trumpet mouthed.....
G. 5. **Megoura** Buckt.
3 Cubital vein once forked.....G. 6. **Toxoptera** Koch
Cubital vein twice forked.
Honey tubes moderately long; style much shorter than honey tubes. ....
G. 7. **Myzus** Pass.
Honey tubes short; style as long or longer than honey tubes. .....
G. 8. **Hyalopterus** Koch
Honey tubes curved and usually enlarged in the middle; style very small or wanting ..... G. 9. **Drepanosiphum** Koch
4 Seventh antennal joint as long or longer than the sixth.
Antennæ not pilose.
Honey tubes longer than thick, cylindrical .... G. 10. **Aphis** Linn.
Honey tubes clavate.....G. 11. **Siphocoryne** Pass.

Subfamily II. **CALLIPTERINÆ.**

TABLE OF GENERA.

1 Seventh antennal joint shorter than the sixth..... 3
Seventh antennal joint as long or longer than the sixth.
Antennæ not pilose; 7th joint longer than 6th, honey-tubes subobsolete; cauda very small.....G. 1. **Cryptosiphum** Buckt.
Antennæ pilose.
Abdomen bare, not hairy or tuberculate.....2
Abdomen hairy or tuberculate.
Rostrum short.....G. 2. **Chaitophorus** Koch
Rostrum long.
Honey tubes pear-shaped; prothorax with lateral teeth.....
G. 3. **Melanoxanthus** Buckt.
Honey tubes short, cylindrical; prothorax without lateral teeth. .
G. 4. **Pterocomma** Buckt.
2 Rostrum extending at least to the hind coxæ .....G. 5. **Pterocallis** Pass.
Rostrum very short, stout, not extending beyond the anterior coxæ . . ...
G. 6. **Ptychodes** Buckt.
Antennæ not pilose..... G. 7. **Myzocallis** Pass.
3 Wings horizontal; rostrum very short; style enlarged at the apex ... ...
G. 8. **Monellia** Oestl.
Wings deflexed; rostrum short, seldom reaching to middle coxæ, style short, globular ..... G. 9. **Callipterus** Koch

Subfamily III. **LACHNINÆ.**

TABLE OF GENERA.

1 Winged forms unknown..... 4
Winged forms known.
Abdomen woolly 3
Abdomen not woolly.

Sixth antennal joint filiform or clavate ending in a spur 2
Sixth antennal joint setaceous without a spur at apex.
Tibiæ and tarsi normal ..... G. 1. **Sipha** Pass.
Tibiæ truncate at tips; tarsi rudimentary, no claws, in place a short mammiferous tubercle ..... G. 2. **Mastopoda** Oestl.

2 Abdomen somewhat hairy; stigmal vein straight or but slightly recurved.
Rostrum very short; honey tubes twice as long as thick; antennæ hairy, 4th, 5th and 6th joints nearly equal ..... G. 3. **Cladobius** Koch
Rostrum not reaching beyond middle of abdomen.
Hind legs lengthened ..... G. 4. **Lachnus** Illiger
Hind legs abnormally lengthened ..... G. 5. **Dryobius** Koch
Rostrum reaching beyond apex of abdomen ..... G. 6. **Stomaphis** Walk.
Abdomen not hairy; honey tubes inconspicuous; third discoidal vein simple, not forked ..... G. 7. **Amycla** Koch

3 Rostrum very short.
Third antennal joint about twice the length of fourth . G. 8. **Phyllaphis** Koch
Third antennal joint as long as the two following; cubitus not forked ..... G. 9. **Prociphilus** Koch

4 Antennæ not pilose; body long and narrow; legs very short ..... G. 10. **Brachycolus** Buckt.
Antennæ pilose.
Eyes moderate; third antennal joint not longer than the fourth; hind tarsi 2-jointed ..... G. 11. **Paracletus** Heydn
Eyes subobsolete; third antennal joint longer than the fourth; hind tarsi one-jointed ..... G. 12. **Trama** Heyd.

Subfamily IV. **SCHIZONEURINÆ.**

TABLE OF GENERA.

1 Antennæ 5-jointed 2
Antennæ 6-jointed.
Hind wings with two oblique veins.
Stigma abnormally lengthened ..... G. 1. **Mindarus** Koch*
Stigma normal ..... G. 2. **Schizoneura** Hartig
Hind wings with 1 oblique vein ..... G. 3. **Glyphina** Koch (= *Colopha* Monell)

2 Hind wings with 1 oblique vein ..... G. 4. **Vacuna** Heyd. (? = *Hormaphis* O. S.)

Subfamily V. **PEMPHIGINÆ.**

TABLE OF GENERA.

1 Wingless forms; the tarsi with but a single claw 3
Winged.
Hind wings with one oblique vein 2
Hind wings with two oblique veins.
Stigma of front wings normal; antennæ short .... G. 1. **Pemphigus** Hartig (= *Thecabius* Koch)
Stigma of front wings abnormal, extending to the apex; antennæ long ..... G. 2. **Stagona** Koch

* This genus may belong to the *Lachninæ* and seems to form the connecting link between the *Lachninæ* and *Schizoneurinæ*.

2 Wings deflexed in repose.....G. 3. **Tetraneura** Hartig
Wings horizontal in repose.....G. 4. **Aploneura** Pass.
3 Antennæ 6-jointed.
Third antennal joint longer than fourth.....G. 5. **Forda** Heyd.
Third antennal joint equal with the fourth.....G. 6. **Rhizobius** Burm.
Fourth joint as long as the first three.....G. 7. **Eudeis** Koch
Antennæ 5-jointed.....G. 8. **Tychea** Koch

Subfamily VI. CHERMESINÆ.

TABLE OF GENERA.

Front wings with 3 oblique veins.
Head with frontal horns; third joint the longest; apterous ♀ surrounded with disks of wax.....G. 1. **Cerataphis** Licht.
Head without frontal horns.
Stigma normal.....G. 2. **Chermes** Linn.
Stigma abnormal.....G. 3. **Adelges** Vallot
First oblique vein with a branch issuing from near its base and which is once forked, the upper branch of which extends almost parallel with the stigma before bending obliquely towards the apical margin.....G. 4. **Anisophleba** Koch

Subfamily VII. PHYLLOXERINÆ.

Antennæ 3-jointed.....G. 1. **Phylloxera** Fousc.

Description of the Larva of Sphinx luscitiosa, *Clemens.*

By Harrison G. Dyar.

Head, shagreened, of a grass green color with two paler green stripes edged posteriorly with a darker shade. Tips of jaws and eyes black. Body, pale green, slightly darker on the posterior segments. On joints 3 and 4 are sparsely distributed white dots, each surrounded by a fine black ring. These spots are also found on the venter and subventral space for the entire length, but diminish in number on the posterior segments. Seven oblique lateral lines on joints 7 to 12, the last one extending from the base of joint 11 over joint 12 to the caudal horn. These stripes are white, shaded anteriorly with dull crimson in which is situated near the edge a very fine black line. Caudal horn green, with a black stripe on each side, this being the continuation of the posterior oblique lateral line. Thoracic feet pale yellowish, tipped with pinkish. Spiracles, reddish. The length of the mature larva is about 60 mm.

The food plant is said to be Willow, which I believe to be correct. The larva from which the present description was drawn was found, fully grown, in a little stream over which bushes of Willow extended. It was nearly drowned and had barely strength enough to revive.

Sphinx luscitiosa is single brooded.

Pupation occurring in July.

Larva from Ulster County, N. Y.

Descriptions of New Species of Mexican Heterocera.

By Wm. Schaus, Jr.

Subfamily CTENUCHINÆ.

Idalus herois n. sp.

Primaries deep yellow, crossed from about the middle of the costal margin to near the internal angle by a black band which is widest at either extremity, and on the outer costal portion the black extends along the margin to the apex; this transverse band is divided into a series of spots by the veins which are gray-white wherever they cross the band; it is also broadly bordered on its entire inner portion, and at either extremity of its outer portion with white. At the base of the primaries is a similarly marked transverse band, and also a few pink scales at the base of the inner margin. Fringes white. Secondaries white, having in the male the outer two-thirds of the wings powdered with pink scales, but in the female only the inner margin is so marked. Underneath whitish with the outer two-thirds of the costal margin on the primaries and two small spots at the end of the cell dull black. Head and thorax white, spotted with roseate-brown. Abdomen above carmine with a dorsal row of white spots in the female; the anus and underside of the abdomen white.

Expanse, 35—45 mm.

2 ♂♂, 2 ♀♀. Coatepec.

Family ARCTIIDÆ.

Arachnis perotensis n. sp.

Male.—Primaries above white, crossed from the costal to the inner margin by numerous irregular brown-gray bands edged with black. Secondaries white, transparent, with a few large gray spots on the costal margin, and a few very small ones on the outer margin; the inner margin thickly clothed with long red scales. Underside the same as upper, slightly reddish along the costal margins. Body rather woolly. Head gray, frons white. Collar white with two large gray spots circled with black. Thorax gray streaked with black and white. Abdomen dull red above with a brown dorsal band, and a lateral row of small brown spots; underneath white. Legs mottled with gray. Expanse 38 mm.

Female.—Primaries similar to the male. Secondaries dull red with three broken and irregular transverse bands of a dull gray margined with a darker shade of gray. Extreme outer margin also dull gray, and the fringes white or dull gray. The underside the same as the upper. Head and thorax the same as in the male. Abdomen not so woolly as in the other sex; above reddish, except the last three segments which are yellowish, and with a dorsal and a lateral row of dull gray spots; underneath white. Expanse, 45 mm.

1 ♂, 3 ♀♀. Cofre de Perote. Elevation, 10,000 feet. From pupæ found under the bark of a species of Pine.

The female bears a strong resemblance to *Arachnis aulea* Bd.

Arachnis suffusa n. sp.

Male.—Primaries white, crossed from the costal to the inner margin by very irregular and broken bands of dark gray narrowly edged with black. Secondaries creamy white with a few black spots along the costal margin and two very small spots at the anal angle. Underside the same as the upper, with the costal margins

and the bases of the wings slightly yellowish. Head white. Collar and thorax white with large gray spots margined with black. Abdomen above bright yellow with a dorsal row of large black spots, and two lateral rows of small black spots. Underneath white. Legs circled with gray and yellow. Expanse, 42 mm.

Female. – Differs in having the transverse bands on the primaries paler and broader. The secondaries are crossed by a basal and two central rows of light gray spots margined with a darker shade of gray, and on the extreme margin below the apex is a row of five similarly colored spots. The abdomen has the dorsal and the lateral spots gray, margined with black. Expanse, 52 mm.

1 ♂, 2 ♀♀. Ex. larva. Rinconada, State of Vera Cruz.

Carales divina n. sp.

Primaries whitish, thickly powdered with drab scales; along the costa three brown blotches extending to the median vein; beyond the cell a wavy brown band crosses the wing from the costal margin to the inner margin; a subterminal wavy brown line, and a terminal series of semi-lunular brown streaks; fringe brown. On the costal margin two short fine dashes of pink and a small pink spot at the base of the wings. Secondaries slightly transparent, gray, with the outer half of the wing rather darker and an indistinct spot at the end of the cell. Underneath the wings are thinly covered with scales, uniform grayish, indistinctly showing the markings of the upper side; at the four apices are a few whitish spots, and at the centre of the costal margins of the primaries a dash of pink. Head, collar, and thorax gray, with two round black spots on the collar. Abdomen above pink with a dorsal and lateral row of black spots; underneath whitish. Thorax underneath pink. Legs gray; fore femora pink. Antennæ gray, pink at the base. Expanse, 55 mm.

1 ♂, 1 ♀, found in copulation on a Pine at an elevation of 10,000 feet on the Cofre de Perote.

Opharus tristis n. sp.

Primaries above uniform dull black, slightly transparent. Secondaries similar but whitish near the base. Underneath the same as above, with the white at the base of the secondaries more conspicuous. Head, thorax and abdomen dull black; on the latter dorsally are two rows of white spots, each placed on the extreme outer portion, and just below laterally on either side are two rows of smaller white spots. Femora streaked with white. Expanse, 50 mm.

1 ♂. Jalapa.

Family **LITHOSIIDÆ.**

Crambomorpha tolteca n. sp.

Primaries above silvery gray-white, with the inner margin broadly shaded with brown. Secondaries pale yellowish. Underside yellow, with the base of the primaries, and also the outer margins broadly gray; the inner and the costal margins of the secondaries whitish. Head, thorax and abdomen above gray, underneath yellowish. Antennæ ochreous. Expanse, 34 mm.

2 ♂♂, 2 ♀♀. Las Vigas and Coatepec.

Leptidule æetes n. sp.

Primaries ochreous, darkest on the margins and with a darker band crossing the wing from the costal margin near the apex to the middle of the inner margin. Secondaries ochreous, slightly hyaline, darkest around the outer margins. Head, thorax and abdomen ochreous. Antennæ black. Expanse, 21 mm.

1 ♂. Paso de San Juan.

Euphanessa pauper n. sp.

Wings ochreous hyaline. On the primaries at the base of the costal margin is a black point; about the center of the cell is a smoky spot, and below it a second similar spot. Just beyond the cell the wing is crossed by a smoky band, having at its upper extremity two short diverging branches, one extending towards the apex, and the other towards the center of the outer margin, in one instance touching it. Antennæ, head, thorax and abdomen ochreous. Expanse, 24 mm.

2 ♂♂. Las Vigas.

Family **MELAMERIDÆ.**

Ephialtias coatepeca n. sp.

Primaries and secondaries velvety black; the primaries crossed from the middle of the costal margin to the anal angle by a rich yellow band; the secondaries with a broadish central yellow band. Antennæ, head, thorax and abdomen dull black. Abdomen beneath white. Expanse, 28—31 mm.

2 ♂♂, 5 ♀♀. Coatepec, Paso de San Juan. Closely allied to *Ephialtias ariaca* Druce.

Melanchroia monticola n. sp.

Wings blue black with the apices of the primaries very narrowly white. Underneath the base of each costal margin bright red. Head, thorax and abdomen dull black. Collar reddish. Expanse, 30 mm.

2 ♀♀. Las Vigas. Elevation, 9,000 feet. Allied to *Melanchroia spuria* Hy. Edw.

Family **DIOPTIDÆ.**

Polypœtes cethegus n. sp.

Primaries above olive brown, paler at the base and along the outer margin; all the veins yellowish-brown; a white spot at the end of the cell. Secondaries white with a very broad abdominal and outer margin, and a narrow costal margin black. Underneath primaries dull black with a white spot at the end of the cell; the secondaries the same as on the upper side. Head, thorax and abdomen dull black above, whitish underneath. Tegulæ ochreous. Expanse, 27 mm.

2 ♂♂, 2 ♀♀. Coatepec. This species is most nearly allied to *Polypœtes etearchus* Druce, but differs from that species in the ground color of the primaries, and also in having the black margin to the secondaries much broader.

Family **CERATOCAMPIDÆ.**

Eacles ormondei n. sp.

Primaries above orange red, except a small space in the cell, a triangular space at the apex and a small space at the anal angle, all of which are yellow. The wings are speckled as in other species of *Eacles* with purplish brown. A straight purplish line crosses the wing from the apex to the inner margin at two-thirds from the base; this line is bordered outwardly on its anterior half with lilac. The wings are also crossed near their base by a narrow dark wavy band. About the center of the outer margin the ground color assumes a darker shade, and at the end of each vein is a small dark spot. The two discal spots dark gray with a few whitish scales in their center. Secondaries yellow, speckled with brown, a purplish wavy transverse band crossing from the costal to the inner margins. An elongated orange red space borders this band on its outer portion. The basal portion of the inner margin and a wavy band at the base of the secondaries also orange red. The discal spot dark gray with a white center. A few dark spots at the tips of the veins along the outer margin. Underneath yellow mottled with lilac and pinkish scales and speckled with brown; a lunular band crosses the wings from the apex of the primaries to the center of the inner margin on the secondaries. Head and collar yellow, thorax orange red; abdomen dorsally orange red, laterally yellow with a row of dark gray spots, and underneath purplish. Expanse, 128 mm.

1 ♀. Coatepec.

Descriptions of New Scydmænidæ and Pselaphidæ.

By E. Brendel.

SCYDMÆNIDÆ.

Brachycepsis n. g. Head twice as wide as long, eyes large, prominent, palpi with the second joint obconical, the last a shorter conical subula, posterior coxæ approximate.

B. fuchsii n. sp. Bright brown, sparsely and coarsely pubescent. Length, 0.8 mm.

Head transverse, vertex half as long as the entire width of the head, base and frontal margin equally wide, parallel, genæ and lateral margin anterior to the eye equal in length and scarcely shorter than the eye, occiput convex, vertex from a line through the middle of the eyes to the frontal margin gradually depressed on either side leaving a slight longitudinal elevation in the middle and deepest near the supra-antennal tubercles in the form of a punctiform foveola; antennal cavities very large, separated by a clypeal septum, clypeus and labrum very short, transverse. Antennæ half as long as the beetle, joints 1—4 oblong, uniform, decreasing in size, 5—7 oval, decreasing in length, 8—10 transverse oval, gradually increasing, 11th as wide as 10th, ovoidal. Prothorax, impunctate, as wide as long, wider than the head, sides anteriorly arcuate, posteriorly sinuate, narrowest in a line through the lateral foveæ, which are situated in an ample longitudinal impression one-sixth of the length from the base, in the same distance in the middle is an obsolete transverse impression. Elytra very convex, not truncate at their apex, though the last segment is partly visible; base narrowly elevated, each elytron bifoveate, the suture near the base elevated. Abdomen with six ventrals, coxæ approximate, thighs slender, the posterior ones more so.

Santa Cruz, California. Charles Fuchs.

Motschulsky's *Scydmænus californicus* may belong to this, but it is reported as being $^7/_8$ of a Parisian line long, while this is 1 mm. shorter. According to the testimony of Dr. D. Sharp an unknown genus. I take pleasure in naming this insect in honor of its discoverer, my friend Carl Fuchs.

Scydmænus (?) minimus n. sp. Brown, slender, punctate, pubescent. Length, 0.45 mm.

Head widest in a line through the eyes, where it is one-third wider than the length from the base to the frontal margin, eyes large, not very convex nor prominent, equally distant from the base and the frontal tubercles, frontal margin nearly as wide as the neck, vertex broadly convex, antennal cavities large, leaving a narrow frontal septum between them, clypeus transverse triangular. Palpi with the third joint obconical, thick, the last a thick subula. Antennæ as long as the head and half of the prothorax conjoined, semigeniculate between the first and second joints which are nearly equal in size, the first oblong, the second globular, 3—7 globular, half as thick as the second, gradually increasing in width, 8 as wide as the second, 9 and 10 as long as the second and respectively two and three times as wide, truncate at the tip, the last joint as wide as the 10th, ovoid, truncate at the base. Prothorax as wide as long, sides evenly arcuate, base one-half wider than the neck, basal angles nearly rectangular, disk convex, minutely foveate near the basal angles and obsoletely trans-

versely impressed near the middle of the base. Elytra two and one-half times longer and one-third wider than the prothorax, shoulders an obsolete longitudinal ridge, base of each elytron semi-circularely depressed. Legs short, all the coxæ approximate, the anterior ones contiguous, metasternum carinate.

Linn County, Iowa. 3 specimens sifted out of decayed wood. I am very much in doubt, whether this species can be retained in the genus *Scydmænus*.

Cephennium anophthalmicum n. sp. Amber-yellow, elongate, convex, impunctate, pubescence long, sparse, regular. Length, 0.9 mm.

Head pendant, as wide as long, vertex smooth convex, twice as wide as the distance from the base to the interantennal line; antennal tubercles flat triangular, clypeus quadrate; eyes wanting. Palpus with the first joint very narrow, cylindrical, three times as long as wide, the second not wider, globular, the third and fourth together thick, obconical, rounded at the tip. Antennæ as long as the prothorax, joint 1 and 2 oblong, obconical, nearly half as wide as long, 3 smaller, little longer than wide, 4—10 globular, 4–6 equal as wide as third, 7 somewhat larger, 8 smallest, 9 and 10 as thick as the second, the last joint slightly thicker, as long as 9 and 10 together, oblong oval. Prothorax nearly as long as wide, sides evenly arcuate, near the base slightly sinuate, basal angles rectangular, explanate, discus equally convex. Elytra a little more than twice as long and slightly wider in the middle than the prothorax, disc convex, lines wanting, suture near the base elevated with a large, pubescent fovea at the base in the middle of each elytron, scutel triangular, four times as wide as its length, shoulders obsolete. Anterior coxæ contiguous, prosternum broad, flat; mesosternum carinate, narrow, truncate posteriorly; middle coxæ small, separated by the mesosternal carina; metasternum very broad; posterior coxæ distant. Tarsi half as long as the tibiæ, the joints subequal, tibiæ strongly clavate, thickest in the distal third.

Alameda County, California. Sifted from vegetable debris together with a large number of *Pinodytes cryptophagoides* by Mrs. Marie Fuchs. One specimen.

PSELAPHIDÆ.

Pselaptrichus n. g. Antennal insertions approximate, front prolonged, narrow, sulcate. Maxillary palpus very long, the second joint sigmoid-clavate and coarsely tuberculate, the third small quadrate, the fourth broadly securiform, as long as the second with short erect pubescence.

P. tuberculipalpus n. sp. Yellowish brown, pubescence in regular rows, form slender, slightly convex. Length, 1.66 mm.

Head flat above, longer than wide, widest between the eyes, which are small and situated at the angles of a pentagon forming the discus of the vertex posterior to the oblong frontal prolongation; the latter nearly quadrate, arcuate in front, sulcate in the middle, the lateral half with the surface plane and inclined toward the sulcus; just before the eye-line are two small foveæ, mutually twice as distant as either from the eye and connected by a straight angular shallow sulcus with the frontal fissure; occiput slightly elevated with a fine carina in the middle, labrum small transverse, clypeus anteriorly trisinuate; antennal cavities large, from the middle of the eyes to the middle of the posterior limit of the antennal cavities a fine carina, and between those cavities a narrow frontal septum. Antennæ as long as the head and prothorax

conjoined, joint 1 cono-cylindrical, half as long as the head, 2 oval, as wide as the first, 3—7 less than half as wide as wide as the preceeding joints, globular, 8 wider, not longer, 9 transversely oval, 10 twice as wide as long, 11 oval, twice as wide as the second joint and one-half longer with long pubescence. Prothorax as long as wide and one-half wider than the head, widest behind the anterior third, where the sides are acutely rounded and toward the neck and the base nearly straight; disk moderately convex, near the base with an angulated transverse sulcus, ending on the sides in an ample impression, containing a small fovea. Elytra across the shoulders as wide as the prothorax, widest behind the middle, where it is one-half wider and along the suture one-third longer than the shoulderwidth; disk rather depressed near the base, sutural lines slightly impressed, basal foveæ small, the sutural ones near a transverse elevation of the base, the discal ones in the anterior part of a shallow, oblong depression, below the humeral ridge a fovea connected by an oblique line with the lateral margin. Abdomen as wide as the elytra, slightly convex without the basal impressions, segments subequal, border narrow. The pubescence of the elytra and the dorsal segment arranged in regular rows. Anterior coxæ contiguous, posterior ones distant, trochanters short triangular, legs slender, anterior femora crenate below tarsi with one claw, second joint twice as long as the third, metasternum not impressed. ♂ anterior tibiæ arcuate with a deep notch inside of the distal fourth of its length, clypeus with a medial ridge. ♀ tibiæ and clypeus simple.

Alameda County, California, discovered by Mrs. Marie Fuchs.

This singular insect unites some of the characters of *Bythinus* (*Machærodes*) *carinatus* and *Pselaphus longipalpus*, the antennæ and the palpi belonging to the European *Machærites* group of the *Bythini*, the form of the head approaching that of *Pselaphus*. According to the testimony of Dr. David Sharp, there is no genus known, with which it can be united.

Euplectus planipennis, n. sp. Piceous brown, abdomen and prothorax paler, much depressed, densely pubescent with fine appressed hair. Length, 1.25 mm.

Head triangular, anteriorly truncate, posterior angles strongly arcuate, eyes very prominent, as long as the genæ, base entire, across the posterior angles twice as wide as the straight frontal margin; frontal tubercles small, space between them and behind the frontal margin deeply concave, occipital foveæ large and connected with the frontal excacation by a very short sulcus, leaving in the middle of the vertex a short acute triangular elevation posteriorly continuous with the occiput. Antennæ one-half longer than the head, joint 1 and 2 nearly equal, rounded, longer than wide, 3—8 very transverse, equal, narrower than the second, 9 one-third wider, 10 twice as long and wide than the ninth, the last joint ovate, truncate at the base, one-third longer than wide, slightlp wider than the tenth, pubescence denser at the tip. Palpi short, yellow. Prothorax very broadly convex, nearly plane, punctulate, sides evenly rounded with the basal angles broadly arcuate, as long as the width of the head, the prominent eyes included, and less than one-fourth wider; disk nearly flat in the middle, an oblong fovea before the middle and large lateral foveæ just behind the middle connected by a fine, straight sulcus, running through a very small median fovea. Elytra one-half longer, across the high shoulders slightly wider, across the tip one-fourth wider than the prothorax, sides behind the middle nearly parallel; disk flat, depressed with declivous sides and tip, very densely pubescent, discal lines two-thirds long, very sharp and fine, the sutural line the same and entire, three basal punctures. Abdomen

with the first and second dorsal bicarinate in the middle, carinæ including one-fourth of the segmental width. Legs short, yellow. ♂ with the last ventral nearly circular and an inconspicuous transverse impression at the base of the penultimate segment.

Linn County, Iowa.

Very distinct by the small head and the form and sculpture of the prothorax.

Euplectus? nova species? or variety of *Euplectus ? armatus.*

This is a singular superscription full of doubt.

The specimens before me seem to be a variety of *Euplectus armatus* Lec. differing from the latter in the sculpture of the vertex, which has the foveæ in one specimen not connected by a sulcus with the transverse frontal impression, in the other there is a faint trace visible, most as in *Euplectus integer*, which it resembles in the whole form and convexity. Besides that, both specimens possesses other important characters of *Trimium.* They have only two basal punctures on the elytron and the first dorsal and second ventral segment is much longer than its neighbors, which in our *Trimium* is the case only in *convexulum* and the fourth dorsal is not perceptibly longer than the third; not at all like a true *Euplectus*, to which *E. crinitus* belongs. This all points to *Trimium* except the stronger border of the abdomen and the form of the antennal club, which latter is decidedly like *Euplectus.* This questionable form seems to be exceptionally North American of the Atlantic Slope. According to Reitter's schema we would have but one *Trimium* and the rest would be *Trimiopsis.* Sharp is unwilling to accept *Trimiopsis.* Those doubtful *Euplectus* would be *Trimium* except for the antennæ. What is to be done?

Constant characters of *Euplectus* are the prolongated fourth dorsal, which in reality is composed of two united segments, and is not connate with the last segment, the form of the antennæ and the third basal elytral puncture, together with the depressed general form. Constant characters of *Trimium* are the varying subequal, dorsal and ventral segments, the wanting prolongation of the fourth dorsal, which is connate with the last segment of the antennal club, and the Batrisus-shaped form of the body and two basal elytral punctures. This schema excludes the *E. arcuatus, integer* etc. which should be set down as *Pseudotrimium* (*Pseudoplectrus?* Reitter) having the 4th and 5th dorsal connate and six ventrals.

Trimium thoracicum n. sp. Saturated yellow, form slender, pubescence, very fine, abundant. Length, 0.9–0.95 mm.

Head narrower than the prothorax, one-fifth wider than long, genæ convergent, eyes not prominent, base impressed in the middle, frontal margin straight, a little more than half as wide as the width across the eyes, the foveæ in a line through the middle of the eye, mutually less than twice distant as either from the eye, circum ambient sulcus distinct, shallow, antennal tubercles small. Antennæ one-half longer

than the head, the two basal joints not as strong as in *T. parvulum*, 8—10 equal in length, each twice as wide as the preceeding one, the last one-fourth longer than its width and twice as wide as the tenth, ovate. The last palpal joint in the outline securiform, but not compressed. Prothorax as long as wide, seemingly longer, equal to one and one-half the length of the head, widest before the middle, sides evenly arcuate, not perceptibly sinuate near the rather small lateral foveæ which are connected with the medial basal small fovea by a straight sulcus one-fourth the length of the prothorax from the base; disk evenly convex, finely and densely punctured. Elytra across the rounded shoulders as wide as the prothorax, before the tip one-third wider and the suture one-fourth longer; disk convex, base with two arcuate impressions leaving between them a broad longitudinal ridge, which in proper light may be traced to one-third of the elytral length. Abdomen with the first not longer than the second, very convex with two very short basal carinæ. Legs moderate, the intermediate thighs lunate, convex anteriorly and nearly straight posteriorly, compressed. The abundant pubescence makes the surface appear lustreless.

Iowa.—On moist rotten wood with ants. Abundant in the time of copulation in June. Differs from *T. puncticolle* by the impression on the occiput and the presence of abdominal carinæ.

Articerus californicus n. sp.

In size and color like *Articerus fuchsii* from Tennessee, but is more slender in form, the head in proportion shorter, the antennæ darker and slightly arcuate, the outlines of the tube-shaped last joint concave, which are in *fuchsii* straight lines, the antennal cavities sharper, limited before the eyes and the root of the basal segment less exposed. Otherwise in every respect like the well-known *A. fuchsii*.

Los Angeles, California.

Note on Hæmatobia serrata R. Desv.

By S. W. Williston.

I have just learned, through the kindness of Professor Lintner, that the *Hæmatobia cornicola*, described by me in the September number of Entom. Americana, had previously been identified through Baron Osten Sacken with *H. serrata* R. Desvoidy, from France and Italy. I very much regret the synonym, which only adds another proof that he who treads on unfamiliar ground finds plenty of pitfalls. Suspecting, as I did, the identity of the two forms, I should have sent specimens for comparison. My only plea is that the multiplicity of my duties compels me to give up further study of our Diptera, for the time, at least. I leave them with the less reluctance, knowing that Mr. Coquillet and Mr. W. M. Wheeler are engaged upon them. Mr. Wheeler writes me that he is making an especial study of the Leptidæ, and I know he will be thankful for material.*

* We shall have some remarks on this note in a future number.

SYNONYMICAL NOTES.

By Geo. H. Horn, M. D.

The species which follow are those described by Prof. E. F. Germar in the work with the title "Insectorum species novæ aut minus cognitæ," a book not in most libraries.

In all there are eighty-two species described from our fauna, forty-one of which retain the specific name. Of the latter fourteen retain the entire name while the remainder have been referred to other genera.

While nearly all of the synonymy below has been made known in a scattered way several names have been forgotten. Believing the publication useful from the convenience of having everything together so that it can be readily referred to, it is offered as a continuation of the series begun a number of years ago.

Insectorum species novæ—E. F. Germar.

Amara luctuosa, p. 10, = Chlænius tomentosus *Say*.
Chlænius erypthropus, p. 11.
Platynus blandus, p. 12, = Platynus cincticollis *Say*.
Pœcilus monedula, p. 18, = Pterostichus submarginatus *Say*.
Molops faber, p. 23, = Pterostichus.
Harpalus merula, p. 24, = Anisodactylus.
Harpalus stigmosus, p. 25, = Selenophorus palliatus *Fab*.
Bembidion intersectum, p. 28, = Tetragonoderus.
Dyticus biguttulus, p. 29, = Ilybius.
Dyticus maculosus, p. 30, = Laccophilus maculosus *Say*.
Gyrinus vittatus, p. 32, = Dineutus.
Buprestis pugionata, p. 37, = Dicerca.
Buprestis liberta, p. 38, = Chalcophora.
Buprestis dentipes, p. 38, = Chrysobothris.
Elater simplex,* p. 42, = Melanotus communis *Gyll*.
Elater semirufus, p. 45, = Limonius basillaris *Say*, ***var.*** *semiæneus* Lec.
Elater circumscriptus, p. 46, = Drasterius elegans *Fab*.
Elater rufilabris, p. 47, = Megapenthes.
Homalisus crenatus, p. 61, = Eros.
Lampyris rosata, p. 62, = Photinus pyralis *Linn*.
Telephorus luteicollis, p. 70.
Malthinus latipennis, p. 72, = Trypherus.
Dasytes trivittis, p. 76, = Odontonyx.
Dorcatoma bicolor, p. 79. (Unknown).
Clerus humeralis p. 80, = Hydnocera humeralis *Say*.
Trichodes apivorus, p. 81.
Silpha tuberculata, p. 81, = Silpha lapponica *Hbst*.
Dermestes caninus, p. 84.
Hister lævipes, p. 87.

* Described from Brazil.

Macronychus variegatus, p. 89, = Ancyronyx.
Sphæridium melænum, p. 96, = Hydrobius globosus *Say*.
Ateuchus probus, p. 98, = Canthon.
Trox punctatus, p. 113.
Scarabæus Egeriei, p. 114, = Geotrupes.
Melolontha annulata, p. 121, = Anomala marginata *Fab*.
Melolontha liberta, p. 123, = Diplotaxis.
Melolontha hexagona, p. 124, = Dichelonycha elongata *Fab*.
Melolontha mucorea, p. 129, = Hoplia.
Upis perforata, p. 148, = Polypleurus.
Helops cisteloides, p. 159.
Helops æreus, p. 160.
Allecula erythrocnemis, p. 164.
Œdemera erythrocephala, p. 167, = Asclera.
Rhipiphorus cruentus, p. 168.
Rhipiphorus sanguinolentus, p. 169, = R. pectinatus *Fab*.
Mordella melæna, p. 169.
Rhynchites, ruficollis, p. 188, = Eugnamptus collaris *Fab*.
Cryptorhynchus aratus, p. 283, = Conotrachelus.
Balaninus pistor, p. 295, = Centrinus.
Calandra compressirostris, p. 300, = Sphenophorus.
Calandra larvalis, p. 301, = Sphenophorus cariosus *Oliv*.
Liparus picivorus, p 311, = Hylobius.
Pissodes nemorensis, p. 318, = Pissodes strobi *Peck*.
Pissodes macellus, p. 319, = Hylobius pales *Hbst*.
Tomicus calligraphus, p. 461.
Apate serricollis, p. 464, = Bostrichus.
Apate aspericollis, p. 465, = Amphicerus bicaudatus *Say*.
Sylvanus planatus, p. 466.
Lamia (*Tetraopes*) arator, p. 486, = Tetraopes canteriator *Drap*.
Cerambyx (*Purpuricenus*) Melsheimeri, p. 562, = Tragidion coquus *Linn*.
Callidium sanguinicolle, p. 515, = Batyle ignicollis *Say*.
Callidium miniatum, p. 515, = Batyle suturalis *Say*.
Callidium (*Clytus*) aspericolle, p. 517, = Neoclytus erythrocephalus *Fab*.
Leptura quagga, p. 521, = Leptura nitens *Forst*.
Leptura erythroptera, p. 522, = L. rubrica *Say*.
Leptura abbreviata, p. 523, = L. vittata *Oliv*.
Leptura distans, p. 524, = Euryptera lateralis *Oliv*.
Orsodacna armeniacæ, p. 526, = O. atra *Ahr. var*.
Crioceris sexmaculata, p. 526, = Lema sexpunctata *Oliv*.
Hispa flavipes, p. 529, = Odontota nervosa *Panz*.
Hispa pallipes, p. 529, = O. rubra *Weber*.
Cassida erythrocera, p. 540, = Porphyraspis cyanea *Say*.
Clytia ephippium, p. 548, = Anomœa laticlavia *Forst*.
Cryptocephalus semicinctus, p. 554, = Cryptocephalus quadrimaculatus *Say*.
Cryptocephalus lativittis, p. 558, = Bassareus lituratus *Fab. var*.
Cryptocephalus obsoletus, p. 559, = C. venustus *Fab., var. ornatus*.
Cryptocephalus picturatus, p. 560, = Pachybrachys.
Colaspis pilula, p. 567, = Nodonota.
Chrysomela puncta, p. 590, = Doryphora.
Galeruca fibulata, p. 601, = Luperus.
Haltica carinata, p. 610.
Lycoperdina vittata, p. 621, = Mycetina vittata *Fab*.

Preparatory Stages of Callosamia angulifera, *Walk.*

By Wm. Beutenmueller.

Egg—Ovoid, flattened above and below, white, shiny. Length 2 mm. width 1 mm. Laid July 2. Emerged July 11th.

Young Larva.—Head dull black with a transverse white band a little before the middle. Labrum also white. Cervical shield black. Body above and below wholly yellow, as are also the tubercles. As the larva grows older a pale blackish transverse band begins to appear on the junction of each segment. Length 3 mm. Duration of this stage six days.

After first moult.—Same as the preceeding stage, except the band on the first segment deep black, and the lateral row of tubercles above the spiracles sometimes black. Length 6 mm. Duration of this stage seven days.

After second moult.—The head is now pale green with two black transverse bands and the body pale whitish green with the dorsal tuberceles and the ones below the spiracles yellow. The tubercles above the spiracles black. The four tubercles on the second and third segments pale orange and much larger than the rest. The transverse band on the segments are now scarcely visible, except along the dorsum they are deep black. Underside semitranslucent, whitish. Length 14 mm. Duration of this stage four days.

After third moult.—The tubercles on the second and third segments are now coral red and the one on the eleventh segment yellow. All the remaining tubercles are reduced to piliferous spots. Length 22 mm. Duration of this stage seven days.

After fourth moult.—Little difference from the preceeding moult except that the tubercles are a little more prominent and having along the sides below spiracles a pale yellow stripe beginning at the third segment and running to the posterior extremity of the body.

Length 35 mm. Duration of this stage five days.

After fifth, the last moult.—No difference from the preceeding moult. Length 60 mm. Duration of this stage six days.

Food Plants. Tulip-Tree, (*Liriodendron tulipifera.*) Wild Cherry (*Prunus serotina*) and Sassafras (*S. officinale.*)

This larva closely resembles that of *Callosamia promethea.* But may be readily distinguished by the yellow lateral stripe and the less prominent tubercles on the second and third segments and also by the smaller piliferous spots which in some individuals are quite obsolete. The larva is also much stouter and larger than *promethea.*

The cocoon can only be separated from *P. promethea* by its larger size. Length 43 mm, width 20 mm.

PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.

The Club began its regular annual session at 2 P. M. August 28th, 1889, in the Biological Building of the University of Toronto. There were present during the meetings, Messrs. C. J. S. Bethune, Wm. A. Bowman, A. J. Cook, H. Garman, Chas. W. Hargitt, L. O. Howard, P. R. Hoy, H. H. Lyman, J. Alston Moffat, E. Baynes Reed, Wm. Saunders, J. B. Smith, E. P. Thompson, and Clarence M. Weed.

The meeting was called to order by the President, Mr. James Fletcher, who then delivered the following annual address.*

At the close of the address attention was called to the absence of the Secretary, and on motion Clarence M. Weed was elected Secretary *pro tem.* A long discussion followed concerning the advisability of organizing such an association as was suggested in the President's address. Letters were read by the President from F. M. Webster, Herbert Osborn, A. H. MacKay, F. B. Caulfield, T. E. Bean, M. H. Beckwith, W. B. Alwood, W. H. Harrington, C. J. S. Bethune, J. B. Smith, and C. M. Weed. Mr. Howard also reported letters from F. L. Harvey, Lawrence Bruner, J. P. Campbell, C. W. Woodworth, C. P. Gillette, S. A. Forbes, E. J. Wickson, J. H. Comstock, all of whom heartily favored such an organization. Those present also expressed themselves in favor of it. On motion the Club then adjourned to 9 A. M., Thursday.

The Club met Thursday morning pursuant to adjournment, Mr. Fletcher in the chair, and proceeded to discuss the entomological matters touched upon in the President's address.

In reply to a query from Mr. Howard, Mr. Fletcher said he never bred any parasites from *Nematus erichsonii*, though he had bred thousands of this species. Mr. Howard said he was especially interested to learn, because a few years ago Dr. Packard described a *Pteromalus* parasitic on this insect which had since proved to be the same as a European parasite.

Prof. Cook and Mr. Howard reported the successful use of poisoned baits of clover and similar substances in destroying cut-worms. The former had tried it in general field culture in Michigan. Patches of clover were sprayed with Paris green water, then the clover was cut, placed in a wagon and carried to the field where it was distributed in forkfuls before the crop was planted. The cut-worms fed upon it and were killed. Prof. Smith reported that this method had also been success-

* Mr. Fletcher has not yet furnished the manuscript of this address, which we hope however to present in a future number.

fully used in New Jersey. Mr. Fletcher called attention to the fact that the worms are not killed immediately but go beneath the soil surface about an inch where they die in course of a day or two.

Prof. Cook had also tried planting succulent plants in fields of grape vines and apple trees to prevent the climbing cutworms from injuring the buds, with considerable success. He had bred *Meromyza americana* from oats very frequently. Prof. Smith had often taken adult *Meromyza* in a sweep-net in New Jersey, but had not known it to do any serious damage. He said that the Wheat Midge did some injury in New Jersey.

Mr. Fletcher thought no remedy for the Wheat Midge had been suggested but that of destroying refuse. Prof. Cook advocated pushing the crop to rapid maturity. Prof. Saunders reported this pest very destructive in many parts of Canada. At Prince Edward's Island farmers plant either very early or very late to avoid it. Had lately seen many flies about infested heads which he supposed to be parasites.

Prof. Cook said that one of the most serious pests in Michigan was the wire-worm for which no successful remedy was known. One year's cultivation of buckwheat would not destroy them. He also asked how Chrysopa larvæ feed, reporting observations indicating that the juice of the victim was sucked in through the long jaws. Similar observations upon the mode of feeding of Syrphus larvæ showed that they partially roll themselves inside out, making a sort of funnel of themselves in sucking their victims.

In speaking of injury to Larches by *Nematus erichsonii,* Mr. Howard reported that Dr. Packard had figured in the forthcoming report of the U. S. Entomological Commission, Larches killed by repeated attacks of this insect, and added that there were Elms of the Department grounds at Washington, that had been defoliated year after year by another insect but yet were still vigorous.

Mr. Saunders reported that the bean crop had been badly injured by cut-worms this year.

Mr. Howard called attention to the ease with which parasites of scale insects can be carried from place to place.

Prof. Smith made some remarks on the structural peculiarities of the genus *Agrotis* tending to show that a loosely assembled mass of species is classed under this generic name. He described the variations in the palpi, the frons, the thoracic tuftings, the antennæ, the legs, the wing form and the general habitus, and showed that any definition of the genus based upon the existing assemblage would take in every Noctuid, with naked eyes and spinose tibiæ, hind wings not red or banded. He gave some of the characters upon which he had divided the genus

and stated that a monographic revision of the species was completed in MSS. and about ready for the printer.

Mr. Weed then read the following:

EXPERIMENTS WITH REMEDIES FOR THE STRIPED CUCUMBER BEETLE.

By Clarence M. Weed.

[SUMMARY.]

(1). The article read by the author embodies the results of the first season's work on a series of experiments undertaken to determine the preventive or remedial value of various methods recommended to prevent the injuries of the Striped Cucumber Beetle, (*Diabrotica vittata.*)

(2). These methods are, for sake of convenience, divided into four classes, viz: (1), The use of offensive odors; (2), Mechanical coatings of the leaves; (3), Poisonous coatings of the leaves; (4), Enclosing plants under tents or gauze covered frames.

(3). The experiments were made on a large scale under ordinary field conditions, during the summer of 1889, when the Striped Beetles were exceedingly abundant.

(4). Five substances of the first class were tested, viz: hen manure, cow manure, kerosene, carbolic acid and bi-sulphide of carbon. None of these proved practically successful.

(5). Three substances of the second class were tested, viz: coal-soot, gypsum, und saltpeter. Of these coal-soot and saltpeter proved worthless, while gypsum showed some beneficial effect, not sufficient however wholly to save the plants.

(6). Three substances of the third class were applied, viz: pyrethrum, slug shot, and peroxide of silicates. Pyrethrum killed those beetles with which it came in contact at first, but soon lost its efficacy. Slug shot injured the plants to which it was applied. Peroxide of silicates had a decided effect in preventing injury, and where the plants had been well started before being attacked saved them from destruction. But it did not save them where the beetles were so numerous that they burrowed down to meet the sprouting plants.

(7). The results obtained from the fourth method — that of fencing out the insects by covering the plants with some form of tent or gauze covered frame, were by far the most satisfactory. The cheapest and most successful method employed was that of protecting each hill by a piece of plant cloth or cheese cloth about two feet square. This may be done simply by placing it over the plants and fastening the edges down by small stones or loose earth. It is better however to hold it up by

means of half of a barrel hoop or a wire bent in the form of a croquet arch.

In the discussion which followed Mr. Howard reported that "X. O. Dust" — a patent combination of ground tobacco and some other substances — had been found a specific for the flea-beetle.

Mr. Smith reported that he had found the same substance an excellent remedy for the Horn Fly, Asparagus beetle larvae, and many other pests. Prof. Cook reported better success with tobacco decoction than dust. Found the decoction the best remedy for use on domestic animals.

Prof. Cook read a paper giving an account of injury to furniture by a small beetle, *Lasioderma serricorne* not hitherto reported to have such habits.

The Club then adjourned to meet at 1:30 P. M.

At the appointed time the Club was called to order by the President. The following paper was then read by its author:

EXPERIMENTS WITH REMEDIES FOR THE PLUM CURCULIO.

CLARENCE M. WEED.

During the spring of 1888 I undertook an extended series of experiments with remedies for the plum curculio, and have reported the results of the first season's work in the Bulletin and Report of the Ohio Agricultural Experiment Station. The most successful method there recorded is that of spraying with London purple, the results indicating that about three-fourths of the cherries liable to injury by the insect can be saved by the treatment, and that as large a proportion of the plum crop as is desirable may thus be brought to maturity. These experiments were repeated this season, and I desire now to present some of the more important results, and to indicate the conclusions to which they point.

EXPERIMENTS WITH CHERRIES.

The principal experiment with cherries this year was a duplicate of the one carried on in 1888, the variety used being a half acre of Early Richmond trees in full bearing. Last year the west half of this orchard was sprayed and the east half left as a check. To eliminate any possible effect upon the results due to the difference in situation and exposure, this year I reversed the treatment, spraying the east half and leaving the west as a check.

So far as possible this experiment was made an exact duplicate of the one last season. During the time of spraying a great deal of rain fell both years, necessitating three sprayings where two ordinarily would

suffice. The first two sprayings this year were made on the same dates as last—May 15th and 21st. — and the third a day earlier, — May 25th. A more dilute solution was used this season however, London purple being applied in the proportion of one pound to 160 gallons of water as against one pound to 100 gallons last year.

The cherries had begun to turn red June 4th, and the examination for curculio injuries began on that date, continuing until June 12th. One thousand cherries were picked from each of twenty-four trees in each half of the orchard, care being taken to select limbs in all parts of the tree and strip them thoroughly. Each tree was labeled with a letter, those on the sprayed portion being tagged as A, B, C. etc., and those on the unsprayed portion which corresponded in situation with those named being labeled A check, B check, C check, etc. As just stated, the checks were selected according to their situation, principally because this was the only practical way of doing it ; and though occasionally a tree and its check would hardly be fair comparison trees because of the difference in the amount of fruit borne by them, the total results could not fail to be correct.

The results obtained, so far as they relate to the injuries of the curculio, are shown in the following table, the columns 1000 being the number of cherries examined, and those to the right the number in each 1000 injured by the insect.

Sprayed with London purple.			Check.	
Tree A.	1000	21	1000	113
" B.	1000	27	1000	121
" C.	1000	26	1000	75
" D.	1000	22	1000	59
" E.	1000	16	1000	220
" F.	1000	28	1000	49
" G.	1000	15	1000	46
" H.	1000	6	1000	59
" I.	1000	2	1000	40
" J.	1000	13	1000	42
" K.	1000	17	1000	30
" L.	1000	6	1000	75
" M.	1000	17	1000	97
" N.	1000	6	1000	27
" O.	1000	3	1000	57
" P.	1000	18	1000	100
" Q.	1000	15	1000	61
" R.	1000	14	1000	82
" S.	1000	26	1000	35
" T.	1000	9	1000	31
" U.	1000	19	1000	59
" V.	1000	6	1000	81
" W.	1000	17	1000	71
" X.	1000	12	1000	60
	24000	360	24000	1483

Percentage .....1.5 Percentage.....6.17

Percentage of Benefit.....75.6.

That is to say these results indicate that 75.6 per cent. of the cherries liable to injury were saved by the treatment with London purple.

It will at once be noticed that the percentage of injury on the unsprayed trees (6.17) was very small, being less than one-half that of last year (14.15). This was probably due in part to the fact that the cherries ripened nearly a week earlier this year, the horticulturist having been picking for market June 11th, while last year it was necessary to wait until June 20th. The ratio between the injury on the sprayed and unsprayed trees, however, was nearly the same, the difference in the percentage of benefit for the two seasons being but .2 per cent.

In the second experiment this year two young trees of an unknown variety were used. They were situated on the south side of the orchard of Early Richmond trees; but were somewhat isolated and much exposed to curculio attack. The variety ripens considerably later than the Early Richmond and consequently like most late cherries it is much more liable to injury.

The trees were sprayed on the same dates as the others—May 15th, 21st and 25th, — and the fruit was examined June 14th. Neither tree bore much over a thousand cherries, so that they were practically stripped by the picking.

The cherries on the sprayed tree showed an injury of 22.6 per cent. while those on the unsprayed tree had been injured to the extent of 57.7 per cent., giving a percentage of benefit of 60.5.

I believe however, that better results would have been obtained had I waited some days to make my first spraying, and made each of the others later. A large proportion of the injuries on the sprayed tree had been made but a short time before the examination, probably after the last application of London purple had been washed off by the frequent rains.

Experiments with Plums.

The plum experiment was not an exact duplicate of the one made last season because the main object this year was to discover some means of preventing the injuries of the Plum Fruit Rot (*Monilia fructigena*). Consequently a combination treatment was necessary. The trees of a half acre orchard containing four varieties were sprayed with London purple alone, in the proportion of one ounce to ten gallons of water, May 15th, soon after the petals had fallen. They were next sprayed May 24th, with a combination of London purple and the Bordeaux mixture, which treatment was repeated June 1st.

No check trees were left in the orchard on account of the fruit rot experiment, but two plum trees on the grounds a short distance from the orchard were left untreated. The latter set a good crop of fruit but

it was entirely destroyed by the curculio, not a single plum being left to mature. The crop in the orchard however, was immense, one-half the fruit on many of the trees being artificially thinned, and then bearing so much that the limbs bent to the ground and in some cases broke on account of the great weight.

Amount of Rainfall.

As already stated a great deal deal of rain fell during the period of spraying, necessitating at least one more application than ordinarily would suffice. The amount of rainfall during the period covered by these experiments—May 15th to June 14th—is indicated in the follow-table :

	Inches.		Inches.
May 19	.74	May 30	.90
" 20	.16	" 31	.13
" 21	.01	June 1	.02
" 22	.19	" 4	.22
" 23	.02	" 7	.22
" 24	.16	" 8	.31
" 25	.01	" 9	trace
" 27	.10	" 10	trace
" 29	.53	" 14	.09

Conclusions.

This series of experiments carried on through two seasons upon two varieties of cherry trees and four varieties of plum trees, during which a grand total of 65,500 cherries have been individually examined, seems to me to confirm the conclusions provisionally announced one year ago, which may now be put in the following form :

(1). That about three-fourths of the cherries liable to injury by the plum curculio can be saved by two or three applications of London purple in a water spray, in the proportion of one ounce to ten gallons water.

(2). That a sufficiently large proportion of the plum crop can be saved by the same treatment to insure a good yield when a fair amount of fruit is "set."

(3). That if an interval of a month or more occurs between the last application and the ripening of the fruit, no danger to health need be apprehended from its use.

(4). That spraying with the arsenites is cheaper and more practical than any other known method of preventing the injuries of this insect.

Mr. Smith called attention to the fact that in New Jersey there was no second brood of the Elm Leaf Beetle this season. Prof. Hargitt reported that peaches were seriously injured by the curculio in south-western Ohio this season.

Prof. Cook then read an extract from a Bulletin of the Michigan Agricultural College concerning spraying with the arsenites, showing that London purple in his experiments had injured foliage more than Paris green.

A long discussion followed concerning the injury of foliage by the application of the arsenites, in which various opinions were expressed, the most important point brought out being the necessity of an exhaustive investigation of the whole subject.

Prof. W. O. Atwater, of the Office of Experiment Stations of the Department of Agriculture, was then introduced to the Club, and gave a pleasant talk, especially with reference to the co-operation of his office with the recently organized Association of Official Economic Entomologists.

The election of officers then took place with the following result: President, A. J. Cook; Vice-President, C. J. S. Bethune; Secretary, F. M. Webster.

On motion of Mr. Smith the secretary *pro. tem.* was authorized to publish the proceedings of the Club in ENTOMOLOGICA AMERICANA.

The Club then adjourned to meet after the adjournment of the Biological Section, A. A. A. S.

On re-assembling, Mr. L. O. Howard read a paper entitled "On the Parasites and Predaceous Enemies of the Grain Plant-louse" in which he reviewed the previous literature and discussed at some length the rearing by the Division of Entomology, U. S. Department of Agriculture, of nine true parasites of *Siphonophora avenæ*. Illustrations of all of the species were exhibited, together with a full series of specimens. The paper was discussed by Mr. Saunders and Prof. Cook.

Mr. H. H. Lyman read a paper on "Variation in the genus Callimorpha," in connection with which he exhibited a large series of specimens and discussed at length the question of specific limitations. The paper was discussed at length by Prof. J. B. Smith.

A letter from Mr. Wm. H. Edwards was then read by the Secretary, giving the results of breeding experiments for the season.

The Club then adjourned *sine die.*

CLARENCE M. WEED,
Secretary pro tem.

The following letter was read by the President after adjournment, before the Association of Economic Entomologists :

"Amherst, Mass., August 26, 1889.

Mr. James Fletcher.

Dear Sir :—Will you please express to the members of the Entomological Club how great pleasure it would have given me to meet with them at Toronto and how deeply I regret that I am not able to do so, but I have only just returned from Europe and find so much to do in disposing of accumulated work, and also in working up my notes taken in Europe that I have no leisure moments for anything else.

The objects of my visit to Europe was were to study the types of North American Pyralidæ in the European museums, and also to get all the hints I could in economic entomology.

The most important collection of course, was that of Guenée which, after his death went into the hands of Mons. Charles Oberthür of Rennes, one of the kindest and most genial of gentlemen it has ever been my good fortune to meet. Here every facility was granted me for the study of his types which are in excellent condition, and they are preserved with scrupulous care.

The detour of the usual routes of travel—from London to Southampton, thence by steamer to St. Malo, cars to Rennes and then to Paris—took me through a part of France not often visited by Americans, a most quaint and interesting region, where the people retain all the old customs of their ancestors.

As is well known, a few of Guenée's species belonged to the collection of Lefebre, and to that of the National Museum. The Lefebre collection has been destroyed but I did not learn any of the particulars. However, as there were only four North American Pyralids in it, and as these are well known we shall not be affected by the loss. How much trouble the loss of the Lefebre collection may cause the students of the Macrolepidoptera, I do not know.

Upon my arrival in Paris, after calling on Mons. Ragonot, I went to the National Museum to see those two insignificant types of Guenée. Not even the Eiffel Tower nor the grand World's Exposition had any attractions for me as long as those two types were unknown. Upon making my business known to Mons. Lucas, he called his assistants and there followed a vast amount of "parlez-vous-ing" and head shaking which looked rather ominous. At last I was told that the types "did not exist any more," that "Guenée did not deposit any types there," and many other discouraging remarks, but I showed them in Guenée's Pyralites that those two types had been deposited there and tried to im-

press upon them the fact that I had come all the way from America to see those two insects and that the proper thing to do was to make an exhaustive search. At last they concluded to look, and after searching for four hours, these types were found and brought to me.

Imagine my astonishment to discover that *Ebulia fumalis* Gn. was our well known *Botis badipennis* Grote, and that *Isopteryx applicalis* Gn. was *Isopteryx xeniolalis* Hulst.

It was true that Walker had names for nearly everything and where there was any doubt, he had given them several, but I had now obtained the oldest names and was sure of my ground. I could now ascend the Eiffel Tower in a happy frame of mind.

The journey into Switzerland along through the Alps and down the Danube to Vienna was a pleasure trip, a constant succession of enchanting views of the wildest natural scenery.

My object in going to Vienna was to see the types of Lederer's Pyralids. These were in several collections, all of which have finally been deposited in the Royal Museum except a few still retained in the collection of Felder in Vienna and a few in the collection of Zeller now in the British Museum. Some of Lederer's types have been destroyed, but I was able to see nearly all of his North American types.

The more I study the work of Lederer, with a knowledge of what his species really were, the less do I esteem it. I have waded through the introduction of his work on the Pyralidæ, which is devoted largely to disparaging the work of his predecessors, especially that of Guenée, and am led almost irresistably to the conclusion that when an author expends a large amount of his vital force in berating others, he has so much the less real force to put into the scientific part of his work.

I visited Dresden and Berlin with the hope that I should find some relics of the Hübner or Zincken collections, but I could find no trace of them, and am inclined to believe that they are entirely destroyed.

However this may ultimately prove, I believe I have been able to determine all of Zincken's North American Crambidæ and nearly all of Hübner's North American Micros.

There is one species of Geyer to which I desire to call the attention of our entomologists, and that is figured in Hübner's Zuträge, Figs. 733 and 734, under the name of *Eucosma tuberculana* from Georgia, presumably a Tortricid but I am very sure it is not. The figure of it in the copy of the Zuträge in the Library of the Buffalo Academy of Sciences, looks like a *Hydrocampa*, but the figure in the copy of the Zuträge in the British Museum looks more like *Eustrotia*. I feel confident that the thing is a Lepidopteron, but beyond that I do not care to express a positive opinion.

It may not have come from North America at all!

Many insects have been described as coming from North America, but when taken out and examined, the original label on the pin shows that they came from South America or some other part of the world. The older European entomologists had a very vague idea of this country, and even the modern European entomologists will sometimes make honest statements about this country enough to make one gasp as though he were in a vacuum.

Some authors have described their insects as coming from "Georgia in Florida" and Martyn in his Psyche in 1797 described a large number of well known Macros from "New Georgia."

The British Museum now contains three very important collections of Pyralids, viz: those of Walker, Zeller and Grote. All this material offers a golden opportunity to some of the Museum employees to make a complete revision of all the described species, both generic and specific, for they are at present in almost hopeless condition. If some one would take up the work and do it exhaustively, taking Lord Walsingham's paper on the North American *Anaphorinæ* or Meyrick's paper on the Australian Pyralids as models, a grand work would be accomplished, one that would cast that of Lederer's entirely into the shade.

The study of all these types shows what utter confusion our Pyralids are in, and I wish to forewarn our entomologists, that a large percentage of our names now in use will have to go into synonomy. Nearly all the names that I have myself given to our Pyralids will appear only among the tail-feathers, but I shall not feel lonely as I have most excellent company. What we have known as *Eurycreon rantalis* will have to struggle along under thirteen different names, and *similalis* Guenée will take precedence over all the others. This variable species must have delighted Walker's heart, for he gave it no less than seven different specific names.

Ten years ago I made myself familiar with the North American Tortricidæ in the foreign museums and have now done the same on the Pyralids and Crambids while Lord Walsingham has made us acquaintad with the Tineids and Feather-wings, and Mons. Ragonot is slowly at work on the Phycids. It now remains for some one to go over the same ground and discover all existing types of the Noctuids and Geometers and get the bottom facts on these families. We shall all bid God speed to Messrs. Smith and Hulst when they go on the mission.

In economic entomology I gained not a single idea. Europeans will have to come to this country to learn the most valuable things in this important branch. While in Berlin I went to the Zoological Gardens and observed that a common Bombycid moth (*Ocneria dispar*) Linn. was exceedingly abundant, flying about among the shade trees on the

grounds, and visitors were catching and feeding them to the monkeys. I found one of the officials and learned that they were much alarmed at the ravages of this insect and were about to take active measures for their destruction. They proposed then to shower the trees with clear water to wash the moths down to the ground where they could be crushed. I asked whether they had used poisonous insecticides for the destruction of the larva but he said that they had not, and he had never heard of such a thing. I suggested that if they should liberate the monkeys and send them up into the trees they would destroy more than they could wash down.

This he took in sober earnest and explained to me at great length why the plan could not be successful. My joke was a failure.

The celebrated Insectarium in the Zoological Gardens in London was very disappointing to me. From all I had read of this establishment I was expecting to gain some very valuable hints on the best methods of breeding insects, but I was astonished at the crudeness of the whole affair.

Finally I think I have reason to feel proud of my American brethren, both the systematic and the economic workers, and trust they will continue their good work.

Hoping that you may have a successful meeting, I remain,

Yours truly,

C. H. Fernald."

SYNONYMICAL NOTES.

By Geo. H. Horn, M. D.

In a letter from Dr. E. Bergroth, Forssa, Finland, my attention was called to the apparent neglect of a few North American Coleoptera, described by Drapiez in the "Annales générales aux Sciences Physiques" Brussels, 1819—1821, and to the fact that the name of but one of them appears in the Henshaw List. They are as follows:

Melolontha minima Drap., loc. cit., Vol. I, p. 291, pl. XI, fig. 2 = *Strigoderma pygmæa* Fab.

Lamia canteriator Drap., loc. cit., Vol. II, p. 47, pl. XVI. fig. 6, is now a *Tetraopes.*

Tenebris striatellus Drap., loc. cit., Vol. 5, p. 327, pl. LXXXIII, fig. 5 = *Nyctobates pensylvanica* De Geer.

Melolontha quadrimaculata Drap., loc. cit., Vol. VII, p. 276, pl. CIX, fig. 2 = *Anomala lucicola* Fab.

From the synonomy given it is very evident why the names have not appeared in Henshaw's List. There are very many other isolated description of our species which are not yet publicly accounted for, notably in the writings of Motschulsky, to which it is my desire to give ation when time can be spared from more serious work.

THE ASSOCIATION OF OFFICAL ECONOMIC ENTOMOLOGISTS.

The tendency to unite for mutual benefit and interest is so natural that whenever there are a number of workers in the same field, there is a natural movement in the direction of association. The creation of Agricultural Colleges and Experiment Stations all over the country — as well in Canada as in the United States has given to Economic Entomology an impulse whose extent is far-reaching and is hardly appreciated as yet. Many—in fact by far the greater number of stations and agricultural colleges have appointed an entomological officer, and the increase of workers thus caused, has resulted in a desire to unite for mutual benefit. The proposition for such a union, first mooted in Insect Life by Dr. Riley, met with little expressed favor at first, but every individual appealed to expressed himself favorably. By far the most enthusiastic on the subject was Mr. Fletcher, the able and energetic Entomologist of the Dominion, by whose efforts and after consultation with Messrs L. O. Howard and J. B. Smith a call was issued to all supposed to be interested in the matter for a meeting to be held in Toronto, during the meeting of the A. A. A. S., at which the matter should be discussed.

Favorable responses were at once received from nearly all states, and quite a large personal attendance was secured. On the 27th of August a lengthy meeting was held at which were present Messrs. J. Fletcher, C. M. Weed, A. J. Cook, J. B. Smith, C. J. S. Bethune, W. Saunders, L. O. Howard, H. Garman, C. W. Hargitt and others not officially interested. Letters were read from a number of gentlemen unable to be present, all favorable in their tendency, and expressing a desire to join such an association. Organization was effected by the election of Mr. Fletcher as Chairman, and Mr. Weed a Secretary, and full discussion of the matter in all its bearings was had. A formal resolution of organization was passed, and the following constitution was adopted.

CONSTITUTION.

1. This association shall be known as The Association of Official Economic Entomologists.

2. Its objects shall be (1), to discuss new discoveries, to exchange experiences and to carefully consider the best methods of work ; also (2) to give an opportunity to individual workers of announcing proposed investigations, so as to bring out suggestions and prevent unnecessary duplication of work ; (3) to assign, when possible, certain lines of investigation upon subjects of general interest. (4) To promote the study and advance the science of entomology.

3. The membership shall be confined to workers in economic entomology. All economic entomologists employed by the general or State Governments or by the State Experimental Stations or by any agricultural or horticultural association, and all teachers of economic entomology in educational institutions may become members of the Association by transmitting proper credentials to the secretary, and by authorizing him to sign their names to this constitution. Other persons engaged in practical work in economic entomology may be elected by a two-thirds vote of the members present at a regular meeting of the Association and shall be termed Associate Members. Members residing outside of the United States or Canada shall be designated Foreign Members. Associate or foreign members shall not be entitled to hold office or to vote.

4. The officers shall consist of a President, two Vice-Presidents and a Secretary, to be elected annually, who shall perform the duties customarily incumbent upon their respective offices. The President shall not hold office for two consecutive terms.

5. The annual meeting shall be held at such place and time as may be decided upon by the Association. Special meetings may be called by a majority of the officers, and shall be called on the written request of not less than five members. Eight members shall constitute a quorum for the transaction of business.

6. The mode of publication of the proceedings of the Association shall be decided upon by open vote at each annual meeting.

All proposed alterations or amendments to this constitution shall be referred to a select committee of three at any regular meeting, and, after a report from such committee, may be adopted by a two-thirds vote of the members present, provided that a written notice of the proposed amendment has been sent to every voting member of the Association at least one month prior to date of action. [SIGNED].

On Aug. 28th, a second meeting was held at which the constitution was formally signed by those present, and the following officers were unanimously elected : President, Dr. C. V. Riley, of Washington ; 1st Vice-President, Prof. S. A. Forbes, of Illinois; 2nd Vice-President, Prof. A. J. Cook, of Michigan ; Secretary, Prof. J. B. Smith of New Jersey. The Secretary and Mr. Howard were appointed a Committee to prepare By-laws, and after agreeing to meet at the time and place of the next meeting of the Association of Agricultural Colleges and Experiment Stations the Association adjourned.

So well started and in a field where so much remains to be done, the Association can scarcely fail of success — unless individual jealousies and ambitions cause its disruption.

ON THE DATE OF PUBLICATION OF WALKER'S AND ZELLER'S CRAMBIDÆ.

By Prof. C. H. Fernald.
Amherst, Mass.

The dates of publication of Walker's Crambites, Catalogue of Lepidopteia Heterocera, Part 27, and Zeller's Chilonidarum et Crambidarum genera et species, have been the subject of much inquiry and investigation.

Walker's work bears the date "March 2, 1863," and this has generally been considered the correct date of publication until recently. The date of Zeller's paper ts simply 1863, but the month is not given.

Before Prof. Zeller's death I wrote to him about various entomological matters, and among others asked him to give me the exact date of publication of his paper on the Crambids, but while he answered all the other questions in my letter he made no allusion to this, and I could not feel sure whether it was an oversight on his part, or whether he knew that his paper was published later than Walker's and did not care to say anything about the matter.

Zeller's paper was published as a part of a school programme, and I now have before me a complete copy of the work, including the programme and Zeller's paper. The translation of the title page is as follows: "Programme of the Public Examination of the Royal Realschool at Meseritz, to take place on the 30th of March 1863, to which are invited all friends of the institution, especially the parents and relatives of all the pupils, by the Director Dr. H. Loew.

Contents.

1. A scientific paper by Prof. Zeller.
2. School news by the Director."

Zeller's paper on the Crambidæ follows this title page and the school news comprising eight pages follows that.

This school news contains, under the title "Cronik," a record of the principal events that took place during the school year that began May 1st, 1862, and ends with a record of the death of a pupil on March 20, 1863, and his burial March 23d.

It is evident, therefore, that this work must have been printed after March 23d, and before the day of the examination, March 30th, 1863, therefore Prof. Zeller would naturally suppose that Walker's Catalogue which is dated March 2, 1863, was published before his paper.

The suspicion that the dates of the Museum Catalogues were not correct was given me by Lord Walsingham, and I at once wrote to Mr. Butler who had the kindness to examine the Museum Records, from

which he learned the following facts: "Volume 27 of Cat. Lep. Het. was ordered printed Feb. 14, 1863. The volume was received from the printer and the price fixed on it, April 18, 1863." This date surely must be regarded as the date of publication, for it could not be considered as published till after it was printed and was offered for sale.

This seems sufficient to establish the fact that Zeller's work on the Crambids was published at least eighteen days before that of Walker.

From the same Records Mr. Butler learned that Part 28, Cat. Lep. Het. bearing the date of Oct. 19, 1863, was not received from the printer and offered for sale till Dec. 19, 1863. and Part 29 of the same work, bearing the date of March 7, 1864, was received from the printer and offered for sale June 25, 1864.

Notes and News.

Phytonomus punctatus has made another start. It appeared this year for the first time near Philadelphia, all the local collectors taking it. I received the larva early this season from the north-eastern section of New Jersey. It does not seem to have done much damage.

* * *

This has been a good season thus far for fungoid diseases of Insects. Thousands of larvæ of the Elm Leaf Beetle have been destroyed in New Brunswick by such diseases. The reverse of the picture is that potatoes are suffering worse than the beetles, and we are more fond of the former than we hate the latter. We are not good at hating anyhow!

* * *

Has any one ever noted that urticating larvæ of Lepidoptera lose this power when parasitized? A parasitized specimen of *Empretia stimulea* was brought me recently, which I found I could handle with absolute impunity.

* * *

Sitones hispidulus another imported pest has been for some little time known as occurring along the sea shore; this year it has taken a start and has been quite commonly taken inland. I am informed that it is quite abundant near Washington, and I have taken it myself in some numbers near New Brunswick. The larva feeds on the roots of clover.

* * *

Raphiteles maculatus Wlk., was bred by me this season from *Pissodes strobi*, upon which it is an external parasite. Mr. Howard, to whom I owe the determination, says it has been heretofore bred only from *Scolytus rugulosus*.

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NOTES ON THE HABITS OF BUPRESTIDÆ.

By Frank H. Chittenden.

In a list of the Buprestidæ of New England published in the present volume of Entomologica Americana (p. 29) the author—Mr. Frederick Blanchard—remarks that many species noted as occurring on the pitch pine (*Pinus rigida*) and at the same time as breeding in the white pine (*P. strobus*) may breed indifferently in either.

In my experience in collecting Coleoptera that infest these trees, I have noticed that while some species evince a preference—e. g. the weevil *Pissodes strobi* for *Pinus strobus*, or the longicorn *Rhagium lineatum* for *P. rigida*—few, if any, are restricted to either tree, but in the event of a scarcity of the favorite food plant, will attack other Coniferæ.

To the list of Buprestidæ mentioned in the article referred to, as infesting either *P. rigida* or *P. strobus* I add the following: *Chalcophora virginiensis*, breeding in *P. rigida*, *Dicerca punctulata*, breeding in *P. rigida*, and frequenting the trunk and foliage of *P. strobus*, *Buprestis striata*, breeding in *P. rigida*, and *Chrysobothris floricola*, frequenting *P. strobus*.

Unless otherwise stated the following mentioned species were collected at Ithaca, N. Y., on the dates given.

Chalcophora virginiensis Drury, *C. liberta* Germar, and *C. fortis* Lec., appear during the first warm days of May, when they may be seen on walls and fences or flying in the noon-day sun. Of *C. liberta* I have a specimen taken April 3rd, 1882, both *liberta* and *virginiensis* are common in May and June, they occur also throughout July, and have been taken as late as August. From what I have been able to learn, it seems that these species disappear, practically, at the end of July and re appear in the following Fall. This would indicate that there are two

broods, one appearing in the Spring and disappearing in July or August and another in the Fall, which disappears with the approach of cold weather. So far as I know, there is no record of the hibernation of the last brood.

C. virginiensis and *C. liberta*—I have observed on the foliage of white and pitch pine as late as Oct. 10th, and specimens have lived under my care feeding on the needles of the latter, for which they show a preference, till toward the close of November.

C. campestris Say.—Several years ago Mr. John Akhurst of this city found some forty or fifty examples of this species at West Hoboken, N. J., sunning themselves on a large dead tulip tree. The species is also known to attack sycamore trees (Ent. Am., vol. II, p. 71,).

Omitting *campestris* and *fulleri* which form one group, if not a single species, the remaining species of the genus may be placed in a second group, which from their known habits, and close relationship, we have good grounds to believe do not differ materially from each other biologically, but like *liberta* and *virginiensis* pass the larval condition in the wood of pines and the adult stage on the foliage of the same trees. Compared with *Chrysobothris* and *Anthaxia* the species of this genus are very sluggish, and do not take readily to flight, but, like many other Coleoptera, when disturbed, fold their legs and antenuæ closely to their bodies, and drop to the ground, where they may easily be captured.

Dicerca divaricata Say—Fitch in his third report on the insects of New York remarks that the beech tree is undoubtedly the original residence of this insect. I have noticed it oftener on this tree than on any other, but have taken it also on apple, maple, and oak. It appears to frequent particularly trees with light colored trunks, which harmonize well with the color of the insect and may serve to protect it against detection by its natural enemies.

D. pugionata Germ.—Two examples taken on trunks of maples. June 5th and Sept. 27th.

D. asperata Lap. & Gory.—Several specimens taken on dead hickory suggest that the species may breed in this wood as well as in oak. May 20th.

D. punctulata Sch.—A living specimen taken in the interior of a large branch of *Pinus rigida* Sept. 15th. Also occurs quite commonly on the leaves and trunks of *Pinus strobus*. Captures on May 10th, June 15th, and Sept. 5th–20th.

Anthaxia viridifrons Lap.—Bred from a pupa taken from a dead branch of shag bark hickory (*Carya alba*) May 14th. Two days after capture it had transformed but remained inactive for nine or ten days

afterward, until the 28th, when it began moving rapidly around in the bottle in which it was confined

From these observations it may be concluded that the insect normally passes some time after transformation in comparative inactivity, and probably does not issue from the wood in which it breeds until at least two weeks after arriving at maturity.

A. viridicornis Say.—Observed on elm leaves June 11th—18th. *A. viridifrons* is noted as occurring on elm also (Ent. Am. vol. V, p. 31).

A. cyanella Gory—Bred from chestnut twigs. May 11th.

A. quercata Fab.—Observed on leaves of chestnut and chestnut oak during June and July.

For convenience I have assumed that the species of Anthaxia above mentioned are distinct, though there are good reasons for the belief that *viridifrons* and *viridicornis* are sexes of a single species, and *cyanella* and *quercata* constitute in like manner another species.

Chrysobothris femorata Fab.—To the list of half a dozen trees noted as being infested by this species I add hickory, having cut the imago from the larval passages in the wood. It was taken during the past season at Staten Island on a log of white birch, May 17th and I have no doubt it breeds in this wood also.

C. dentipes Germ.—From the uniformity and frequency of the occurrence of this insect on pines, it is doubtful if it breeds in any but coniferous trees, although Harris (Ins. Inj. to Veg. p. 49) states that it inhabits the trunk of *oaks!*

C. sex-signata Say.—One specimen cut from a beech tree in which it had bred. In the list previously referred to (p. 31) this species is mentioned as having been beaten from pitch pine.

C. azurea Lec.—Taken by Mr. A C. Weeks on dead sumach (*Rhus toxicodendron*) on Long Island and Staten Island, N. Y. in June.

Acmæodera culta Web, like other species of the family is peculiarly a sun beetle. I have repeatedly examined the flowers of *Geranium maculatum* in the shade without ever discovering a single specimen, while the flowers that were exposed to the sun fairly swarmed with the little beetles. They eat the petals of this plant and of the wild rose also. June and July.

Agrilus egenus Gory.—Bred in great numbers from the twigs and smaller branches of the common locust tree (*Robinia pseudacacia*). The larvæ form mines under the bark, eating both bark and wood. Some little time is required by the imago to issue from the wood. On one occasion, May 8th, many specimens were observed with their heads, and in some cases, thorax and anterior legs projecting from the bark, and some were still to be seen in that position two days later. Of the beetles

breeding in confinement two were found dead as early as April 21st, a larva was taken as late as May 4th and a pupa was placed in alcohol May 22d. The adult insects feed upon the leaves of the locust. Latest capture was on June 21st.

Brachys ovata Web.—Mines the leaves of oaks. I have seen one specimen bred from an oak leaf.

B. aerosa Melsh.—Occurs commonly on elms.

My observations on the following species coincide substantially with Mr. Blanchard's list. *Dicerca lurida* Fab., under stones in early spring. *Chrysobothris scabripennis* Lap. & Gory on white pine in May and June. *Eupristocerus cogitans* Web. on alder, *Agrilus bilineatus* Web. and *A. interruptus* Lec. on oak, and *A. politus* on willow.

Cryptocephalini found on Ceanothus Americanus.

The following is a list of some of the species of Cryptocephalini taken at Ithaca, N. Y. in July on the New Jersey tea plant (*Ceanothus americanus*). *Babia 4-guttata* Oliv., *Bassareus mammifer* Newm., *Cryptocephalus 4-maculatus* Say, *C. binominis* Newm., *C. quadruplex* Newm., *C. venustus* Fab., *C. mutabilis* Melsh., *Pachybrachys othonus* Say, *P. trinotatus* Melsh., *P. sobrinus* Hald., *P. luridus* Fab., *P. infaustus* Hald., *P. femoratus* Oliv., *P. subfasciatus* Hald., *P. tridens* Hald. (one specimen). *Babia 4-guttata* occurred in considerable numbers on the leaves, which they had devoured quite badly; of the other species, some were found on the leaves, some on the flowers, and many were observed on all parts of the plant.

Many other Coleoptera frequent *C. americanus*, among others many species of Mordellidæ, Malachiidæ and Cistelidæ. *Cistela sericea* Say, often occurs in such numbers as to almost exclude all other species.

F. H. C.

A Stridulating Carabid.

Having recently seen a statement that *Cychrus*, *Nomaretus* and *Harpalus* among the Carabidæ of this country are known to stridulate, I may add to the list, *Omophron*. During the past season I have repeatedly observed the habit in *O. americanum*, Dej. and I have no doubt that many other genera will be found to have stridulating habits, if collectors will only be careful to observe them before consigning them to the alcohol or cyanide bottle.

F. H. C.

A Vulnerable "New Species."

By Eugene M. Aaron.

In his "Contributions to Science," Vol. I, No. 2, July 1889,* Mr. Chas. J. Maynard, the author of the "Butterflies of New England," describes as a new species an extreme form of *Agraulis vanillæ*, which has long been recognized by collectors as commonest in the West Indies. This description, under the name of *A. insularis*, affords an interesting instance of what can be done in the creation of new species if one assumes that an extreme form is a constant one, and then advances to the work without sufficient acquaintance with the literature, already sufficiently full.

The following remarks from this description are quoted as pertinent to this paper:

"I can find no description of any species of *Agraulis* from the West Indies, and Kirby does not even give *vanillæ* as occuring there." * * *

"General pattern of coloration similar to that of *A. vanillæ*, but the ground color is paler, the size smaller, and the wings are broader in proportion to the length." * *

"Dimensions: ♂ *insularis*, spread of wings, 2.40; primaries, 1.20 long by .65 wide; secondaries, .75 long by .78 wide. Antennæ, .60 long. Length of body, including head and palpi, .80. ♀, spread of wings, 2.50; primaries, 1.35 by 80; secondaries, .80 by 80."

"Average *vanillæ*: ♂, spread of wings, 3.00; size of primaries, 1.60 by .80; secondaries 1.00 by .80. Antennæ, .70. Length of body, 1.20. ♀, spread of wings, 3.40. Primaries, 1.60 by .80; secondaries, 1.20 by 1.00." * * *

"*Insularis* differs from it (*vanillæ*) in being paler, in having the two inner spots in the central cell fused together, these being separate in *vanillæ*, and in having only two white dots in the lowest spot." * * *

Alluding to the dimensions: "This is especially discernible in the secondaries, which are not only as broad as they are long, but are sometimes actually wider than long, whereas in *vanillæ* the reverse is the case and the secondaries are always narrower than long. * *

"Yet I have never seen a specimen (*vanillæ*) east of the Gulf Stream."

Accompanying this description is a plate, seemingly photo-engraved and colored by hand, giving figures of typical ♂ *insularis* and ♂ *vanil-*

* Received at the Philadelphia Academy of Sciences, Oct. 10th, 1889.

læ, above and beneath, and the chrysalis of the latter. These are sufficiently accurate to identify either or both as *vanillæ* but not sufficiently exact to serve to clearly illustrate the very minute differences on which this species depends for its future life.

Taking the above questions in their order, we first come to the very remarkable statement that our author can find "no description of any species of *Agraulis* from the West Indies." Such Fathers of our Science as Linné, Fabricius and Cramer, credited *vanillæ* to "America" in general; and Linné quotes it as from Georgia and from Surinam. Boisduval and Leconte say: "It also inhabits the Antilles and nearly all of South America." Passing by the median ground of such authors as La Sagra, Herrich-Schaeffer, Geyer, Poey, *et al*, all of whom have referred *vanillæ* to the Antilles, we come to such recent writers as Bates, who in his "Nymphalinæ of the Amazon Valley", (Journal of Entomology, No. 4, June 1864), says of *vanillæ*: "This well-known and very common species has the widest range of all the members of the *Calænis* and *Agraulis* groups, being found throughout Brazil, and as far north as the Southern States of North America, including the West Indies." Following him, Butler, in his indispensible work on the Fabrician types in the British Museum reiterates this wide extent of its range. In his "Annotated Catalogue of the Diurnal Lepidoptera of the Island of Cuba," Senor Don Juan Gundlach, (Papilio, Vol. I, pp. 111–115,) gives *vanillæ* a place in the rich fauna of that island, where it is well known to collectors to be not uncommon. And to end with Kirby, our author notwithstanding, does give *vanillæ* as occurring in the West Indies in the very comprehensive habitat "Georgia ad Braziliam."

During a residence of several years in East Tennessee *Agraulis vanillæ* was observed by me to be one of the commonest species in that region and as it was one of the hardiest it was raised by me in greater numbers than any other butterfly. This experience taught me that there was a very considerable range of variation in the relative proportion of darker scales which make up the spots and marks, and in the nacre scales which beneath give it the silvery-spotted character. There was also a considerable variation in the size and, I now notice on looking through some of this material, also a variation in the proportions of the wings, the females inclining to greater robustness in this particular.

Tabulating the differences pointed out by Mr. Maynard as distinguishing these two species we have the following:

CHARACTERS.	*Vanillæ.*	*Insularis.*
1. Ground Color :.....	....	Paler.
2. Size :	.....	Smaller.
3. Proportionate breadth of wings :	Always narrower than long.	Broad as long.
4. Inner spots in cell of primaries :	Separated.	Fused.
5. Number of white dots in same cell :	Three.	Two.
6. Habitat :	West of Gulf Stream.	East of Gulf Stream.

Now let us with a considerable material before us question these characters, and see whether they are of such nature as to warrant their being elevated into the specific ranks. First, as to ground color. No one should know better than our author, who has travelled and collected over a large extent of territory, the illusiveness of this character. As a matter of fact his plate fails to show any difference in the general shade of the two species and our comparisons of a large series covering a wide geographical range points out the fact that while the West Indies seem to afford a greater number of pale males and less suffused females the United States also furnishes no inconsiderable number. The palest specimen we have yet seen is a ♂ in the collection of the American Entomological Society from Georgia. Oddly enough the most brilliant and deepest tinted specimen in that collection is from those taken by Dr. Abbott at Samana Bay, Hayti.

Second, as to the relative size. While our author's plate shows an even greater variation than his text would indicate in this particular, and while it is evident that there is a considerable difference in this particular and in the outline of the wings if the two forms are constant, here again it is found that the intergrades are a formidable factor—predominate in fact, the extreme forms being unusual either on the main land or the islands. A lot of starved larvæ of *vanillæ* turned out a lot of males in Tennessee in 1877, which on an average measure considerably less than the dimensions given for *insularis*. The effect of such a climate as holds in the Greater Antilles on both the size and suffusion of markings of a species has already been fully pointed out by me in Papilio, Vol. 4, pp. 26—30.

In the third case, we find the proportionate dimensions of the wings relied upon as another character on which this species is to be based. All Lepidopterists must know that this is a very variable feature; one that can at times be relied upon as pointing out the sex, but never a secure foothold for the student of species in the Rhopalocera. In some species the seasonal broods vary considerably in this particular, but even then it is not a safe guide, as only by the careful measurement of thousands of specimens would it be safe to declare the "average" of any form. This whole question of relative proportions has been treated of over and again, but no one has done it in a neater manner than has Prof. S. H. Peabody, who, in the Canadian Entomologist, (Vol. 8 pp. 141-148,) comments on the genera of Mr. Scudder's "Systematic Revision." He thus sums up the question: "Can they mean that any difference which can be formulated in the ratio of length to breadth in the same part, or of length of one part to length of another part, is a difference of ultimate structure? * * Does this principle extend through Zoology? Is Gen. Sheridan, who is short and stout, and who, according to President Lincoln, can scratch his ankle without stooping, generically, different from Gen. Sherman, who is tall and slender, and whose ankles are evidently out of his reach?"

Now for the markings. The fourth character consists of separated spots in the interior pair in the cell of the primaries of *vanillæ*, while in *insularis* they are fused. It is the fusion of such spots or bands that forms our common black variety of *Papilio turnus-glaucus*. Melanism has long been too well understood as an aberrant or at best varietal disposition on the part of many butterflies to merit its elevation to a specific character from so slight an example of its display as here afforded. At most these spots of *vanillæ* have but to thicken to a one-half greater radius and they have joined. The pale specimen, already alluded to as from Georgia, has not only these two spots fused, but the black scales thicken and run along the lower margin of the cell, join the two outer spots, which are also fused, in a loop and then these four are joined to the outer and upper of the three spots usually found across the disk. Thus they form a rude, tip-tilted, written letter Y.

As a fifth consideration of importance we have the fact offered that in *insularis* there are but two white dots in the four spots contained in the cell of the primaries while in *vanillæ* the lower of the inner two is also pupilled, making three spots in that species. Were Mr. Maynard a resident of this vicinity we should much like to show him *insularis*, typical in this respect, from Tennessee and the North Carolina mountains. But a hasty glance through the specimens at our disposal shows that the two spotted form is as liable to turn up from Brazil, Mexico, Hayti,

Cuba, New Grenada, or our Southern States. It is as vain to hope for constancy in this particular as it is in the suffusion of the already closely placed spots. Every possible form from one very faint white ocellus to four distinctly marked ocelli may be found. In some of the black spots, which to the naked eye seem devoid of any trace of ocelli, the pocket lens will show an occasional white scale ; present as a veritable mocker at the stability of "*insularis*, n sp."

The sixth characteristic, if such it may be termed, viz : habitat, has already been exploded by what we have said of the authorities who have given *vanillæ* a home in the Antilles. To that list might be added such well known catalogues as Dr. Strecker's "Butterflies and Moths of North America," and Mr. Scudder's "Synonymic List of American Nymphales." Both of these authors give the Antilles as a habitat for *vanillæ*, as does also Snellen in his report on the Diurnals found on the Island of Curacao, in the Tidschrift voor Entomologie, Vol. 30, p. 20. One naturally wonders who the authors were that Mr. Maynard consulted on this subject, when such well known and constantly used works of reference were overlooked. There are four species of the *Agraulis* group that are known to have been found in the West Indies.

Before closing this paper it will be of interest and will still further show the uncertain condition of this "new species" to offer a few notes on some of the more remarkable specimens over which I have looked in preparing this paper. Two specimens from "Hacilada de Bledos", Mexico, (Dr. Palmer) have unusually bright red coloring and deep markings, but they also have the *insularis* measurements In one of these there is a pupil in both of the inner cell-spots, and none whatever in either of the outer. Two specimens from New Grenada, in the Titian R. Peale collection, have but one white spot ; in general color they are *insularis*, but in measurements and proportions they are *vanillæ*. Two from the Island of St. Thomas and three from Cuba (all in the Peale collection) are all of the *vanillæ* form. In the St. Thomas specimens there is a tendency to entire obliteration of the ocelli. One of the specimens from Cuba ("from Ramon de la Sagra, 1833") has 3 ocelli, and another from the same island is a typical *vanillæ* in every particular. A specimen from Guanoxuato, Mexico ("Prof. Millington, 1835") has the inner spots apart more than their own width. Beneath it is peculiar in that it has the outer spots in cell fused into a large tripartate nacre spot with a black inter-bordering. A specimen from San Domingo (Frazar) though of the *insularis* form has the inner two spots not only widely separated, but has the lower one nearly wanting, thus presenting the very opposite of fusion.

"The King is dead ! Long live the King !" carried hope and joy to many hearts. Not so, "The new species is dead ; long live the synonym." Perhaps no feature of the study of entomology carries greater terrors with it than does the mastery of the overburdened synonymy. Many a good student and capable naturalist has turned away from it all in disgust and what has been the gain of some other science has been our loss. All of which teaches the lesson that should be ever before us —there are many writings of the Fathers in Entomology to be searched through, large public and private collections to be examined, and an enormous mass of current literature to be mastered before it is safe to say that at present less than one half the species described in the last ten years outside of Africa, are likely to maintain their specific validity, and no inconsiderable portion of these new species are built on synomical piles that are already reared nigh unto toppling.

In closing I wish to state where the names of *vanillæ* and *insularis* are used herein, they are used in the sense employed by Mr. Maynard. There is no doubt in my mind that it was the insular form, in an extreme departure, that was originally used as the type of *vanillæ* and it is that which should be known as such. If it is thought best to separate as a variety our North American continental extreme form, that should be called *passifloræ*, as was done by Fabricius in 1793.

FOOD-PLANTS OF LEPIDOPTERA, No. 12.

(**Samia Cynthia** Dr.)

By William Beutenmüller.

Rutaceæ.

Ptelea trifoliata *L.* (Hop Tree).
Phellodendron amurensis *Rup.*

Ilicineæ.

Ilix opaca *Ait.* (American Holly).

Simarubeæ.

Ailanthus glandulosus *Desf.*

Magnoliaceæ.

Liriodendron tulipifera *L.* (Tulip Tree).

Berberideæ.

Berberis vulgaris *L.* (Barberry).

Tiliaceæ.

Tilia americana *L.* (Basswood).
" pubescens *Ait.*
" Europeæ (European Linden).

Sapindaceæ.

Acer pseudoplatanus *Linn.* (Maple).

Rosaceæ.

Prunus serotina *Ehrh.* (Wild Black Cherry).
" Virginiana *L.* (Choke Cherry).
" domestica *L.* (Cultivated Plum).
Spireæ sp.

Hamamelideæ.

Liquidambar styraciflua *L.* (Sweet Gum).

Cornaceæ.

Cornus stolonifera *Michx.*
" florida *L.* (Flowering Dog-wood).

Laurineæ.

Sassafras officinale *Nees.* (Sassafras).
Lindera Benzoin *Meis.* (Spice-bush).

Caprifoliaceæ.

Viburnum Lentago *L.* (Nanny-berry, Sheep-berry).

Euphorbiaceæ.

Ricinus communis (Castor-oil Plant).

In addition to the above list of food-plants of *Samia cynthia,* the species has also been recorded to feed upon various other plants. But as the list only contains such plants of my own observations, the following were omitted : *Rhus* (Sumac), *Anagallis* (Pimpernel), *Lonicera* (Honey-suckle), *Euonymus* (Spindle Tree), *Celastrus scandens* (Bitter-sweet), *Salix* (Willow), and Celery.

Society News.

Brooklyn Entomological Society. Sept. 3rd, 1889. Nine members present. President Casey in the chair. The loan by Prof. Julius E. Meyer of his fine collection of Lepidoptera, the result of some thirty years of labor, to the Institute, was reported. Capt. Casey related incidents of recent collecting of *Staphylinidæ*, *Pselaphidæ* and *Scydmænidæ* in Rhode Island, particularly with reference to *Euæsthetus* and *Trogophlœus*, the ♀♀ of the former genus exhibiting clearly defined specific differences—proving the correctness of the species lately described by him. Discussion followed on the habits and methods of collecting minute Coleoptera, in which Messrs. Casey, Chittenden and Weeks took part.

Mr. Angelman exhibited a specimen of *Prionidus cristatus* known as the "wheel bug," then occurring in the New Jersey peach orchards.

Mr. Doll exhibited a hermaphrodite specimen of *Callosamia promethea*, the right pair of wings and the right antenna being those of the ♀ and the left of the ♂ except a rectangular blotch or break on the secondary disclosing the marking and coloration of the ♀. The maculation of the ♀ prevailed beneath.

Mr. Weeks read a paper entitled "How to catch butterflies," indicating the method of capturing them intact by the use of a large net and appropriate cyanide jar. After general discussion the meeting adjourned.

* * *

October 1, 1889.—Meeting at Brooklyn Institute. 16 persons present. President Casey presiding. Messrs. H. S. Woodman, Julius E. Meyer, W. C. Wood and Rev. J. L. Zabriskie were elected members of the Entomological Department. Mr. Weeks stated the percentage of certain lepidopterous larvæ destroyed by *Tachina*, so far as his experience went, to be about 66. Prof. Smith noted the remarkable spread this year of *Phytonomus punctatus*; the reported localities in New Jersey in which the 17-year locust had appeared; the increase of *Sitones hispidulus*, upon clover roots, and the importation of a cattle fly, and also related his experience in collecting from the surface of water during the process of flooding a cranberry bog. Insects in great numbers of many species appeared where nothing was previously visible. Podurids covered the surface so densely that *Staphylinidæ*, *Scydmænidæ*, *Pselaphidæ*, *Carabidæ*, *Coccinellidæ*, and other families were supported by them. A favorable wind finally blew the floating mass to an angle in the shore where it gathered in a heap and rendered collecting easy and profitable. Mr. Palm expressed his opinion relative to collecting in Northern Germany. Dr. Zabriskie had observed *Corixa* attracted by light and entering the room through a window screen. Mr. Beutenmüller had taken what he supposed to be *Euphanessa meridiana*, natural habitat Florida, and also described the difference between the larvæ of *Callosamia angulifera* and *C. promethea*. Capt. Casey gave blackboard illustrations showing the structural differences of the secondary sexual characters of *Stenus* and *Euæsthetus*, a specimen of which latter Mr. Weeks exhibited. Prof. Smith commented upon the importance of sexual characters as a basis of determination. Adjournment.

* * *

November 5, 1889.—Meeting at Brooklyn Institute. 17 persons present. President Casey presiding. Minutes of October meeting approved. The following persons were elected to membership in this department: H. S. Harbeck, N. Y. City; H. F. Wickham, Iowa City, Ia.; John Akhurst, Brooklyn; George E. Ashby, Brooklyn, and Col. Nicholas Pike, Brooklyn.

Mr. Neumoegen opened scientific discussion by reading descriptions and exhibiting specimens of *Parnassius smintheus*, var. *nanus*; *Arctia dieckii* n. sp., British Columbia; *Ira gundlachiana* n. sp. S. E. Cuba; *Sphingicampa bisecta*, var. *nebulosa*, n. var., and *Horama jalapensis* n. sp. of Mexico, and further exhibited ♂ and ♀ specimens of *Ornithoptera victoria* from the Solomon Isles, *Armandia thaitina* and *liddalii*, and other rare species of exotic Lepidoptera. Discussion by Messrs. Graef, Hulst and Smith.

Mr. Smith continued scientific discussion by presenting a proposed revision of the North American Agrotids based upon structural differences.

Discussion by Messrs. Graef, Hulst, Hooper, and Smith.

A. C. Weeks, *Rec. Sec.*

INDEX TO AUTHORS AND SUBJECTS.

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LEPIDOPTERA.

COLEOPTERA.

HEMIPTERA.

GENERAL INDEX.

ERRATA.

Page 32, No. 60, for *Brachysorata* read *Brachys ovata.*
" 40, top, for *Cylleus* read *Cyllene.*
" 54, for *Catocolæ* read *Catocalæ.*
" 174, line 14, for "fine black spots" read five etc.

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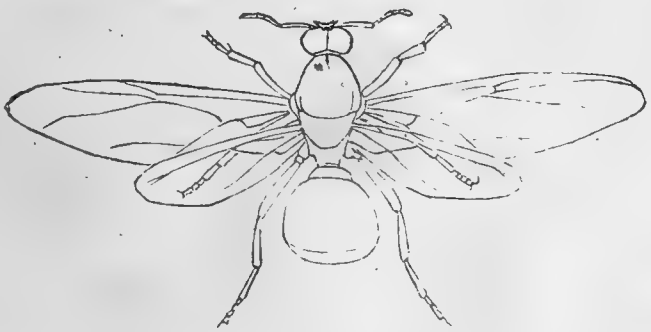

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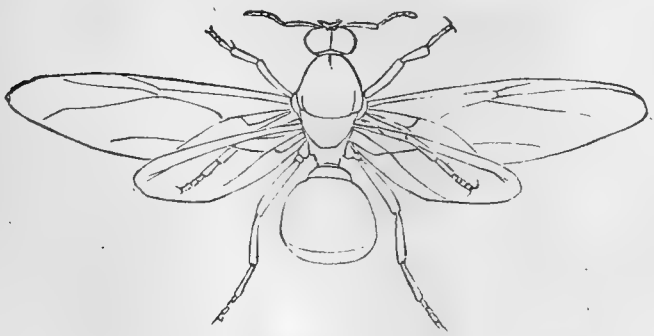

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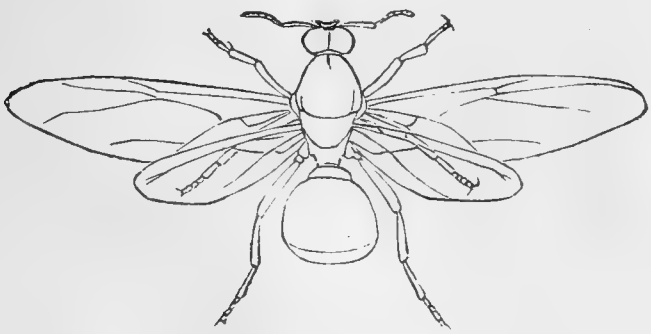

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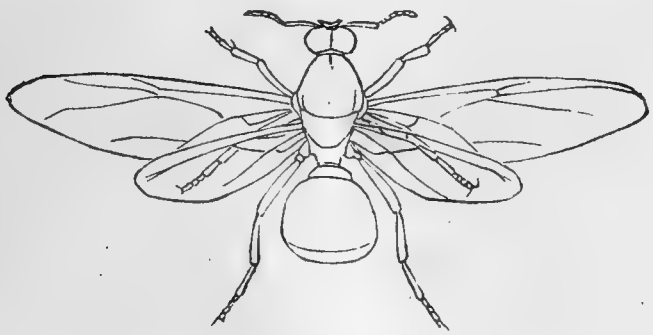

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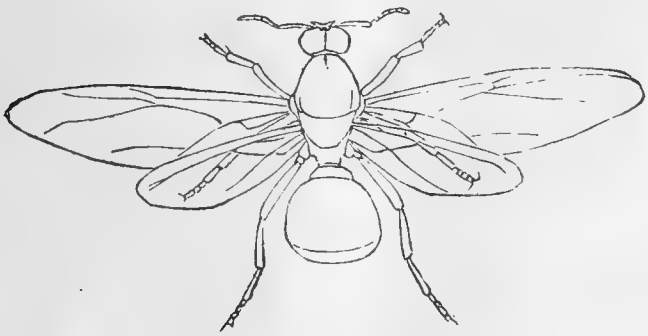

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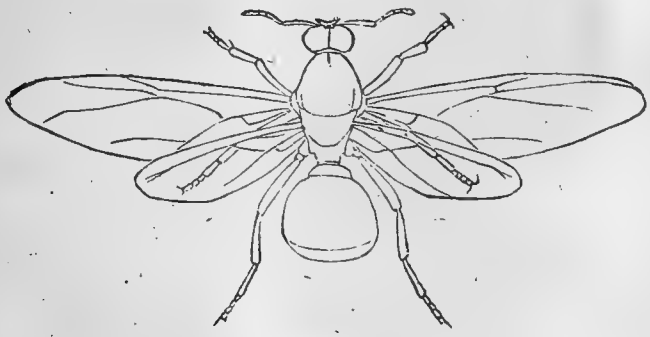

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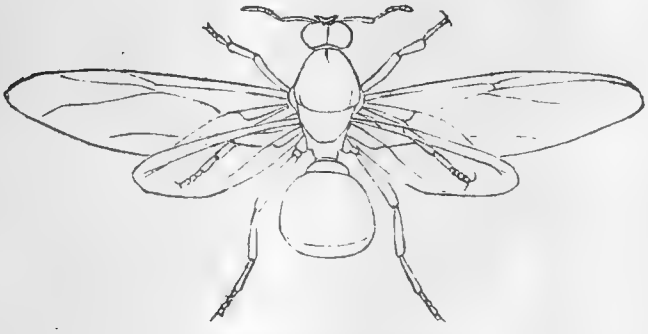

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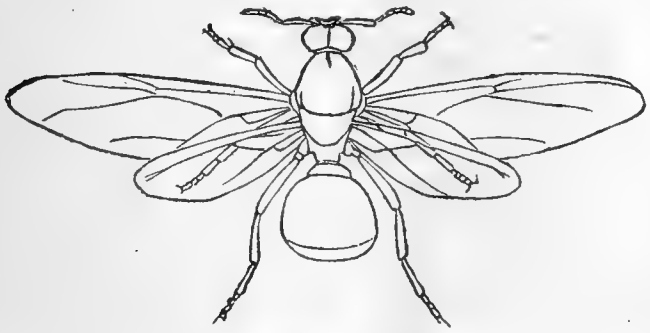

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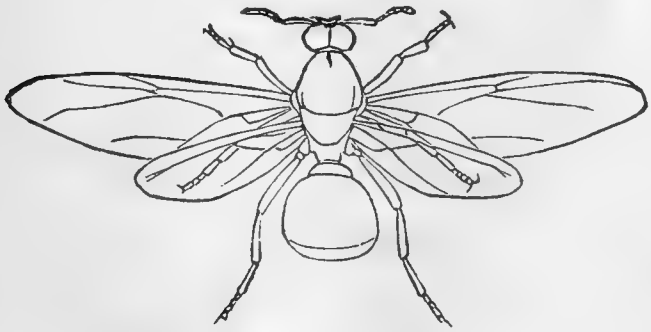

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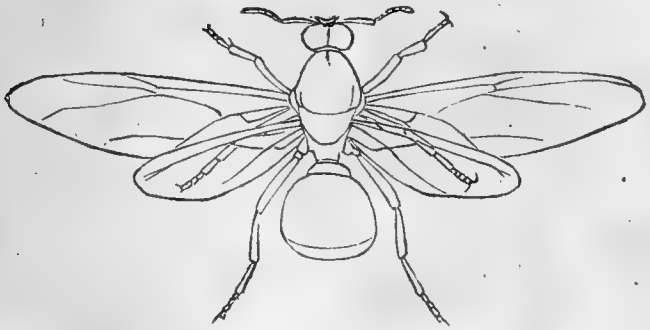

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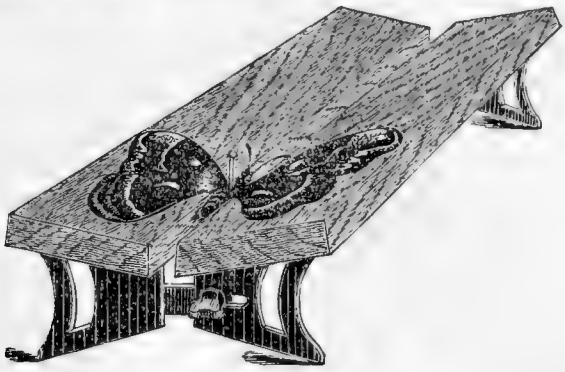

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