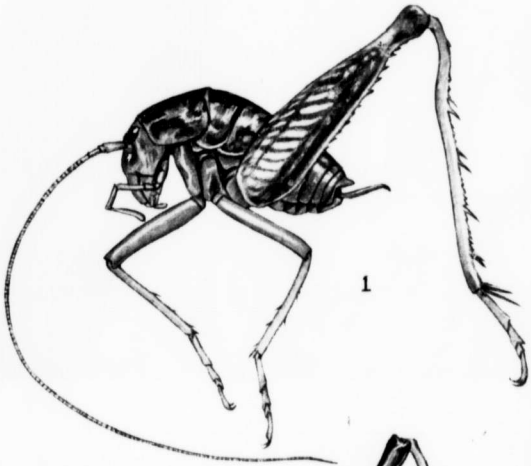

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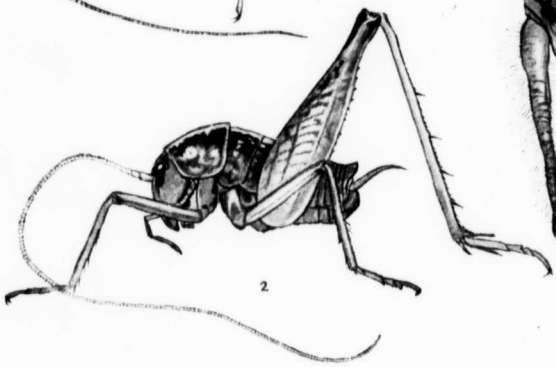

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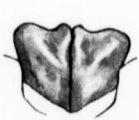

1b

1c.

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E.M.Walker del.

LOCUSTIDAE OF ONTARIO.

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# NOTES ON THE LOCUSTIDÆ OF ONTARIO.

BY E. M. WALKER, B. A., M. B., TORONTO.

(Continued from p. 38.)

## Sub-family *DECTICINÆ*.

22. ATLANTICUS PACHYMERUS, Burm.—The Shield-back Grasshopper.

*Decticus pachymerus*, Burm., Handb. der Ent., II., 1838, 712.

*Thyreonotus pachymerus*, Scudd., Bost. Journ. Nat. Hist., VII., 1862, 453.

*Atlanticus pachymerus*, Scudd., CAN. ENT., XXVI., 1894, 179.

Measurements: Length of body, ♂ 17–23 mm., ♀ 20–22 mm.; of pronotum, ♂ 8.8–9.3 mm., ♀ 8.5–9 mm.; of hind femora, ♂ 16 mm., ♀ 16.5 mm.; of tegmina, ♂ 7.3–8 mm.; of ovipositor, 18.3–19 mm.

This large brown insect, the "Shield-back Grasshopper," is readily known from all others in our fauna by the large size of the pronotum, which extends back over the first abdominal segment, the rudimentary tegmina in the male and the absence of these organs in the female.

The only Ontario specimens I have seen are three males and two females, which I captured at Arner, Essex Co., on Aug. 9, 1901. They were found in the more open parts of a dry upland wood, consisting chiefly of oak and other hardwoods. Most of them were found on the short grass which was growing on the slopes of a ravine in the wood.

## Sub-family *STENOPELMATINÆ*.

The only genus represented in Ontario is *Ceuthophilus*, and it is a very difficult one to deal with, only the matured males of many species being separable in anything like a satisfactory manner.

Through the kindness of Mr. Henshaw I was able to compare my specimens with those in the Scudder collection, and found that our commonest species is undescribed, and that Scudder's types of *terrestris* include two species, one of which is identical with *C. neglectus*, Scudd.

The characters which I find of most value in separating the species of this genus are the form of the sub-genital plate and ninth dorsal segment

of the males. The former, especially, varies greatly in shape, but, strangely enough, has been quite ignored by entomologists.

Key to males of the species of *Ceuthophilus* found in Ontario:

A. Hind margin of 9th dorsal segment of abdomen distinctly emarginate; hind tibiæ arcuate in their basal third.....1. *maculatus.*

AA. Hind margin of 9th dorsal segment entire, rounded. Hind tibiæ straight.

B. Outer carina of hind femora with less than 20 spines, usually 12 or 13, well separated from one another.....2. *pallidipes*, n. sp.

BB. Outer carina of hind femora with 25–30 small teeth, crowded together over two-thirds or more of its length.

C. Hind femora as long as or barely shorter than hind tibiæ, and not more than 3 times as long as broad; fore femora but little longer than pronotum.....3. *neglectus.*

CC. Hind femora distinctly shorter (about one-tenth) than hind tibiæ, 3½ times as long as broad; fore femora at least a third longer than pronotum.....4. *terrestris.*

23. CEUTHOPHILUS MACULATUS, Say.—The Spotted Stone Cricket

*Rhaphidophora maculata* (Say, MS.), Harris, Ins. Inj. Veg., 1841, 126.

*Phalangopsis maculata*, Harr., Ins. Inj. Veg., 1862, 155.

*Ceuthophilus maculatus*, Scudd., Bost. Journ. Nat. Hist., VII., 1862, 434.

Measurements: Length of body, ♂ 14 mm., ♀ 16 mm.; of pronotum, ♂ 4.6 mm., ♀ 4.8 mm.; of anterior femora, ♂ 6.6 mm., ♀ 5.8 mm.; of hind femora, ♂ 15.5 mm., ♀ 15 mm.; of hind tibiæ, ♂ 16 mm., ♀ 15.3 mm.; of ovipositor, 9.3 mm.

On July 1st, 1903, while collecting at Niagara Glen, I found a number of *Ceuthophili* under two or three large flat stones in a dry open wood, just above the Glen. They were nearly all immature, but three males appear to be full-grown, or nearly so, and are easily recognizable as *maculatus*. This is the only time I have come across this species in Ontario, although I have found it common in certain parts of Quebec. It is doubtless, however, pretty generally distributed over the Province, wherever suitable conditions for its existence obtain.

The measurements given are taken from mature examples from the Isle d'Orleans, P. Q., as my Ontario ones, if full-grown, are rather undersized.

I found this species in considerable numbers on the Isle d'Orleans, under flat stones at the bottom of a wooded hill. They were associated with *C. terrestris*.

The best character for distinguishing the males of this species from those of the other species of this region is the emarginate hind margin of the 9th dorsal segment and the peculiar shape (Pl. IV., fig. 1) of the subgenital plate. The fore femora are frequently more than a third longer than the pronotum.

24. CEUTHOPHILUS PALLIDIPES, sp. nov.

Of medium size and moderately stout. Fore femora no stouter than the middle pair, one third or a little more, longer than the pronotum, and about three-sevenths the length of the hind femora. Fore tarsi faintly or no longer than the pronotum, rather slender. Middle femora with 1–3 spines on the front carina, and with 0–3 on the hind besides the genicular spine. Hind femora about as long as the body, moderately stout, about 3½ times as long as broad, the upper margin more convex than the lower, which is nearly straight in its proximal half. A very few raised points usually present on the upper part of the inner surface. Inferior sulcus very narrow, except at apex, rather deep, rounded when not altered in shape by drying. The spines on the outer and inner carinæ in the male are very variable, both in number and size, but are never conspicuous. There may be from 10 to 18 on the outer and 8 to 15 on the inner, but are usually 12 or 13 on each. They are nearly equal in size, and more or less irregularly scattered over the apical half or two-thirds of each carinæ. In the female there are about the same number, or fewer, very minute and delicate spines distributed in a similar manner. Hind tibiæ faintly longer than the femora, moderately slender, the spurs longer than the tibial depth, usually set at an angle of 60° or 70° with the tibiæ, but very variable in this respect. Inner middle calcaria nearly or quite as long as the first tarsal joint. Extremity of male abdomen slightly swollen, the 9th dorsal segment somewhat upturned and produced into a short truncate supra-anal plate, its corners well rounded. Subgenital plate of male large, convex and upturned, divided by a deep median fissure into two spoon-shaped lobes, which slightly overlap in the middle line. Each lobe is about one-half longer than broad, its upper margin nearly straight,

separated from that of the opposite lobe by a V-shaped space, and meeting the straight anterior margin at a right angle. Cerci very nearly as long as the breadth of the hind femora, tapering from a fairly stout base. Ovipositor about three-fifths the length of the hind femora, nearly straight, tapering, especially in the proximal half, the basal third considerably swollen ; apex upturned and sharply pointed. Teeth of inner valves five, sharp, nearly equidistant.

General colour pale reddish-brown. Two broad shining black bands above, fading into pale yellowish-brown half way down the sides of the thorax, and separated by a broad mesial band of orange or reddish-brown, which passes along the thorax to the first or second abdominal segments, where it begins to be broken up into small spots. These spots are small and few on the pronotum, but become larger and more numerous posteriorly, forming tolerably regular transverse rows on the abdominal segments, there being a single row for each segment. The dark colour often becomes more grayish and less shiny on the abdominal segments. Eyes deep black ; antennæ brownish, annulate with pale yellowish. Face, under side of body, and legs, pale reddish or yellowish brown. Fore and middle femora infuscated apically ; hind femora pale reddish-brown, mottled above with darker brown, the usual scalariform markings rather pale, much less distinct than in *C. maculatus* or *terrestris*. Hind tibiæ and tarsi pale yellowish, the spurs deep black at base, pale apically. Cerci reddish-brown, infuscated apically. Ovipositor shining reddish-brown.

Measurements : Length of body, ♂ ♀, 14 mm.; of pronotum, ♂ 4.1 mm., ♀ 4.3 mm.; of fore femora, ♂ ♀, 5.8 mm.; of hind femora, ♂ 13.5 mm., ♀ 14 mm.; of hind tibiæ, ♂ ♀, 14.8 mm.; of ovipositor, 9 mm.

Ten males, 10 females. Niagara Glen, Ont., Aug. 18, 1904 ; Toronto, Aug. 5, 1904 ; De Grassi Pt , Lake Simcoe, July 13–15, 1901, Sept. 7, 1902, July 18, 19, 1904 ; Lake Muskoka (small island) Aug. 27, 1899 ; Ragged Lake, Algonquin Park, Aug. 17, 1903.

This species is most closely related to *C. latens*, Scudd., although differing greatly from that species in the character of the spines on the under side of the hind femora of the male, the latter being also much stouter in *latens*. It closely approaches *latens*, however, in all other respects, including the peculiar structure of the male genitalia. The ovipositor in *latens* is less swollen at base. In colour and markings the two species are nearly identical, but in size *latens* is much the larger.

*C. pallidipes* is the commonest species of the genus in central Ontario, usually occurring under chunks and small logs in woods. On Aug. 8, 1904, I found them in some numbers on the slope of one of the Rosedale ravines at Toronto, but the area over which they occurred was limited to a few acres. There were two or three or more individuals under nearly every chunk of wood, most of them mature. At De Grassi Point, Lake Simcoe, I have occasionally taken them in rotten sodden logs. In one such log seven adults were found together.

As is commonly the case in *Ceuthophilus*, the young nymphs may be found at any time in the year, for although most of them mature in the summer from eggs hatched in the spring, a few pass the winter as young nymphs, the eggs not having hatched until the fall. They usually reach maturity about the first or second week in July, and continue until the second week in September.

25. CEUTHOPHILUS NEGLECTUS, Scudd.

*Ceuthophilus maculatus* (pars), Scudd., Bost. Journ. Nat. Hist., VII., 434 (1862).

*Ceuthophilus terrestris* (pars), Scudd., Proc. Amer. Acad. Arts. Sc., XXX, 46 (1894).

*Ceuthophilus neglectus*, Scudd., Proc. Amer. Acad. Arts. Sc., XXX., 67 (1894).

I have but one pair of this species, about half grown, taken from under a stone at Niagara Glen, Aug. 18, 1904. A number of very young individuals were also found with them. They were kindly determined for me by Mr. A. P. Morse, who compared them with material in the Scudder collection. I was afterwards able to confirm his determination.

*C. neglectus* is an eastern species, ranging from Vermont and Northern New York to Virginia.

Figs. 3, 3a, Pl. 5, were drawn from one of Scudder's type specimens. Figs. 3b, 3c are from my immature male, and probably do not exactly represent the form of the subgenital plate in the adult.

26. CEUTHOPHILUS TERRESTRIS, Scudd.

*Rhaphidophora lapidicola*, Scudd., Proc. Bost. Soc. Nat. Hist., VIII., 7 (1861).

*Ceuthophilus lapidicolus*, Scudd., Bost. Journ. Nat. Hist., VII., 435 (1862).

*Phalangopsis lapidicola*, Bess., Rep. Iowa Agric. Coll., VII., 206 (1877).

*Ceuthophilus terrestris*, Scudd., Proc. Amer. Acad. Arts. Sc., XXX., 46 (1894).

Measurements: Length of body, ♂ 12.5 mm., ♀ 14 mm.; of pronotum, ♂ 4.5 mm., ♀ 4.25 mm.; of fore femora, ♂ 6.3 mm., ♀ 5.75 mm.; of hind femora, ♂ 14.3 mm., ♀ 12.7 mm.; of hind tibiæ, ♂ 15.5 mm., ♀ 14 mm.; of ovipositor, 7.5 mm.

This is the species to which most of Scudder's types belong, but the few mature males in the collection are identical with *neglectus*, and his description of *terrestris* is evidently based partly upon these. His statements regarding the hind femora and tibiæ especially apply to *neglectus*. The chief distinctions between the two species in this particular are given in the above key. The legs in *terrestris* are much longer and more slender; and the scalariform markings on the hind femora much more distinct, closely resembling those of *maculatus*, though usually paler, as Scudder himself has defined them.

*C. terrestris* has a more northern range than *neglectus*, being characteristic of the Boreal and Transition zones.

The specimens of undoubted *terrestris* in the Scudder collection are from the following localities: Anticosti; Gorham, Norway, and Moosehead, Lake region, Me.; Mt. Washington and Franconia, N. H.

In Ontario I have taken it at Niagara Glen, Aug. 18, 1904; Toronto, Aug. 8, 1904; Goderich, Aug. 19, 1901; De Grassi Pt., Lake Simcoe, June 29, 1901 (half grown), Sept. 7, 1902; and I have also a female from Morris Id., Lake Joseph, Muskoka, taken by Mr. E. M. Morris, July 12, 1888. I have not found *terrestris* common anywhere in Ontario, but came across it in considerable numbers on the Isle d'Orleans, P. Q., Aug., 1904, under flat stones, at the foot of a wooded hill. It was in company with *C. maculatus*.

Mr. J. A. G. Rehn has recently reported the true *terrestris* from Keweenaw Bay, Lake Michigan.

## Explanation of Plates.

### Plate IV.

Fig. 1. Ceuthophilus maculatus, ♂, Isle d'Orleans, P. Q. (× 3).

1a. Ceuthophilus maculatus, ♂, terminal segments of abdomen from above (× 10).

1b. Ceuthophilus maculatus, ♂, subgenital plate, from below (× 10).

1c. " " " subgenital plate, lateral view (× 10).

2. " pallidipes, " Lake Simcoe, Ont. (× 3).

Fig. 2a. Ceuthophilus pallidipes, ♂, terminal segment of abdomen ( × 10).
2b. " " " subgenital plate, from below ( × 10).
2c. " " " subgenital plate, lateral view ( × 10).

Plate V.

Fig. 3. Ceuthophilus neglectus, ♂, Scudder's type ( × 3).
3a. " " " terminal segments of abdomen ( × 10).
3b. " " " subgenital plate, from below ( × 10).
3c. " " " subgenital plate, lateral view ( × 10).
4. " terrestris, " Isle d' Orleans, P. Q. ( × 3).
4a. " " " terminal segments of abdomen ( × 10).
4b. " " " subgenital plate, from below ( × 10).
4c. " " " subgenital plate, lateral view ( × 10).

## ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR. T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 93.)

*Tortrix conflictana*, Walk.—Five specimens; Lethbridge, Macleod and Pine Creek; VII., 8, to VII., 13. Larger and the bands more suffused than Eastern specimens.

*Tortrix argentana*, Clerck.—Three specimens; Macleod and Lethbridge; VIII., 8 to 15. I have a long series of this species from Western America, south nearly to Mexico, and north to British Columbia, likewise a series from Europe, and every time I examine them I am impressed with the feeling that our American species differs from the European, but further study is required before deciding either way, in the meantime the European name can stand. This Tortrix is easily mistaken for *Crambus perlellus*, Scop. See comparative notes under the latter name.

*Eulia triferana*, Walk.—Two specimens; Regina, VI., 8 to 20, rather badly rubbed, but matching exactly Eastern examples in my collection under this name; this species is either the most variable of all Lepidoptera or else a good many more than one have been lumped under the one name. This is the most Western record I know of.

*Phalonia angulatana*, Rob.—One specimen; Regina, VI., 18. New Western record, common in the Eastern States, and recorded from Texas.

PYRALIDÆ.

*Nomophila noctuella*, Schiff.—One specimen; Regina, IX., 5. Common in all known regions of the world.

*Loxostege chortalis*, Grt.—Six specimens; Regina, VI., 18. Rather common, wherever it is found, from North Atlantic States westward. A dainty quaker-gray species, with fine rippling lines of a darker shade.

*Pyrausta submedialis*, Grt.—Nine specimens; Regina, VII., 11, to VIII., 11. Eight of typical light form, one very dark, lines almost obsolete.

*Pyrausta unifascialis*, Pack.—Three specimens; Calgary, VI., 6; Macleod, VII., 2; Saltcoats, (?) VII., 13. This is quite common throughout the West, and is subject to a very wide range of variation, both in size and colour, as the several synonyms indicate.

*Pyrausta fodinalis*, Led.—Three specimens; Macleod, VI., 28–VII., 2; Calgary, VII., 6.

*Pyrausta ochosalis*, Dyar (not Fitch).—Two specimens; Macleod, VII., 3; Pine Creek, VII., 11. Recorded from Kaslo, by Dyar, and very well represented by fig. 57, plate XLVII., in Holland's Moth Book.

*Loxostege sticticalis*, Linn.—Twelve specimens; Regina, VI., 8, to VIII., 15; Calgary, VII., 6; Abernethy, VI., 27; Indian Head, VI., 29. This common species is found throughout the Middle Northwest.

*Loxostege commixtalis*, Walk.—Two specimens; Regina, VI., 18, very similar to preceding, but can be separated by the yellow outer marginal line which widens into a narrow irregular fascia, and the presence of numerous short horizontal black lines and dots.

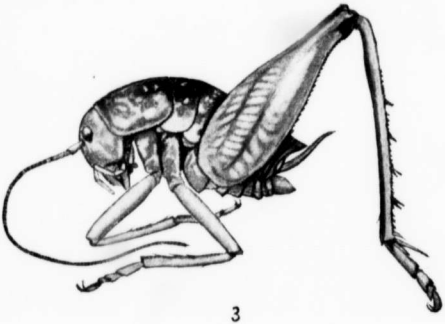
*Cornifrons simalis*, Grt.—One specimen; Lethbridge, VII., 11. Recorded by Dyar, from Kalso, previous records Montana and Oregon. I have a long series from Utah (Poling).

*Scoparia centuriella*, Schiff.—Three specimens; Lethbridge, VII., 11. Pine Creek, VII., 13; Calgary, VIII., 1.

*Pyralis farinalis*, Linn.—One specimen; Lethbridge, VII., 11. This is the common Grain-moth treated of in all lists of injurious insects; it probably feeds on a number of roots and stored foods; I have bred it from dried Tulip and Crocus bulbs.

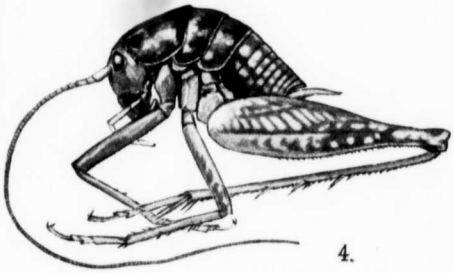
*Crambus plumbifimbriellus*, Dyar.—Five specimens; Lethbridge, VII., 11.

*Crambus perlellus*, Scop.—Nine specimens; Regina, Lethbridge, Macleod and St. Albert, VII., 3, to VIII., 15. This pure pearly-white Crambid is reported by Dr. Fletcher and Mr. Willing to occur in myriads, every step through the grass of the prairie lands disturbing dozens. This species is very often confounded with *Tortrix argentana*, Clerck. The



3

3a.



4.

4a.

3b.

3c.

4b.

4c.

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coloration and size of both are identical, and they can only be separated by structural characters. The easiest to observe is the length of the palpi, which in the Tortrix is hardly as long as the head, while in the Crambid the palpi project forward between two and three times the length of the head.

*Crambus pascuellus*, Linn.—Two specimens; Lethbridge, VII., 11. I have no Eastern or European examples of this species, it compares exactly with a long series from Verdi, Nev., (Vachell), and South Utah, (Poling). Fernald states that the larvæ feed on grass, and habitat from Massachusetts to California and Europe.

*Crambus trisectus*, Walk.—Seven specimens; Regina, VIII., 13. Do not differ from a long series from Colorado (Nash), Manitoba (Heath), and other Western localities. Can be easily identified, as it is one of the largest of the pale- or ashy-brown species without metallic ornamentation, with two oblique darker brown lines parallel to outer margin, one about middle of wing, the other between it and margin; these dark lines are easily rubbed off, and while some specimens show only the costal half, in others it is almost obliterated. Fernald's figure, in Crambidæ of North America, is as much unlike this species as it is possible to draw it.

*Thaumatopsis Fernaldella*, sp. nov.—Head, palpi, thorax, abdomen, egs, and front wing, light ochreous-brown, or pale fawn-colour.

Front wing: A darker shade of brown along costa from base to inner third.

A median white streak from base to end of cell, beginning at base as a line and widening on its lower edge until it involves the whole width of cell at its outer end. The lower edge of this streak overlaid with a line of dark brown scales and a shade of lighter brown above the dark line. Above the white streak is a brown shade from inner third to apex, interrupted at end of cell, a thin, very dark line between this shade and the white. Beyond end of cell the white streak is outlined by a brown shade forming an abbreviated transverse fascia.

A narrow white sub-terminal fascia, overlaid with silvery-metallic scales from dark shade to dorsal margin, is bounded inwardly and outwardly by brown lines. Between end of cell and sub-terminal line, the veins are white, vein vii. being most pronounced and the white line over this vein is the one that interrupts and indents the brown shades above median white streak. A short, oblique streak of brown on middle of dorsal margin. On costa, before apex, a pale spot, and adjoining it

towards base a slighter darker spot, both of which are the terminations of faint, almost obsolete lines of these colours lying above dark median shades. Seven dark purple or black dots on extreme outer margin, one at end of each vein, the space between these dots and sub-terminal line, ground colour, not crossed by white or brown lines. Cilia white, dotted with fuscous, and with a narrow, silvery-white metallic line at its base, through which runs a thin line of fuscous.

Hind wing: Above and beneath pale fuscous with a purplish reflection, in some specimens nearly white towards base; cilia white. Under side front wing brownish-fuscous.

Antennæ pectinate in ♂. Expanse 23 to 31 mm.

Sixteen specimens; Anglesea, N. J., June and September; Key West, Fla.; Las Cruces, N. M., (Cockerell 2071); Walter's St., Cal., April, (J. B. Smith); Yellowstone Park, Wyo., July, (H. S. Burrison); Fort Collins, Colo., August, (C. F. Baker); South Utah, July, (W. Barnes, M. D.). Co-types U. S. Nat. Mus., No. 8218; collections of Prof. Fernald, and my collection.

The Key West specimen is the most strongly marked; it differs from all of the others in several particulars, notably: The transverse median line is well defined and continued to dorsal margin, but interrupted between each vein; between the dorsal margin and median streak are a number of white horizontal dashes and the sub-terminal line curves inward to a greater degree, leaving a much wider space between it and termen. This specimen is, therefore, included with a question mark.

Fernald's figure of *T. edonis*, Grt., very fairly represents the markings of the front wings of typical specimens, and I should have been inclined to refer my specimens to Grote's species, but Prof. Fernald assures me that they are not the same, and I take pleasure in bestowing his name on this widely-distributed species.

I have specimens from Mr. Willing that are marked very much the same as *Fernaldella*, but the colours are ashy-gray, with no ochreous shades, these may prove to be a distinct species, but I prefer to regard it at present as a variety.

*Thaumatopsis Fernaldella*, var. *nortella*, var. nov.—Palpi pale gray, heavily speckled with dark purplish; antennæ same, pectinate in ♂; head and thorax cinereous.

Fore wing: Ashy-gray, with median white streak and dark shades same as *Fernaldella*, but latter much more intense, nearly black. The transverse dark shade at end of cell is absent, and the white median streak

continues outward to termen, in a broad white shade. The sub-terminal line is obsolete and the row of black dots nearly so. Hind wings less white and more whitish-purple or ashy-white.

Seven specimens; Regina, VII., 20, to VIII., 13; Lethbridge, VII., 11; Pincher, VII., 10. Co-types, U. S. Nat. Mus., No. 8219; Mr. Willing's collection and my collection.

*Ambesa laetella*, Grt.—Two specimens; Regina, VII., 20.

*Laodamia fusca*, Haw.—Three specimens; Regina, VIII., 13.

*Epischnia Boisduvaliella*, Gn.—Four specimens; Regina, VI., 18; VIII., 13, and IX., 2.

*Hulstia undulatella*, Cl.—Four specimens; Lethbridge, VII., 11.

*Homœosoma electellum*, Hulst.—One specimen; Regina. Bred from larva on buds of *Grindelia*. Larva, IX., 19; issued X., 5. Accompanying this specimen is a very well preserved larva, and at the request of Dr. Dyar I make the following brief description:

Length, 11 mm. Robust, cylindrical, thoracic segments tapering to head. Diameter through abdominal segments, 2 mm.; width head, 1 mm. The larva is very beautifully marked with five purple and four yellow streaks from head to anal segment. The dorsal stripe is purple, one sub-dorsal and one sub-spiracular on each side of the same colour. Between these bands are yellow stripes of about half the width of the purple; doubtless the yellow of the dried larva was a dull or light green when alive. Ventral region dull ochreous-yellow (also green naturally?).

Head: Small, rounded, retracted, not outstretched, light chestnut brown, mouth-parts and ocellic field dark brown and a horizontal black streak caudad from latter on each lobe, ocelli pale luteous, raised like tiny drops of dew. Antennæ either very short or broken off of this specimen. Clypeus high, sides straight, triangularly to a point at top of head. P. t. shield large, chitinous, shining ochreous, with a posterior black line on dorsum, extending down on each side and enlarging into an ovate black spot; narrowly surrounding this spot, except posteriorly, is a pale yellow line. Thoracic feet very dark brown or black, short. Four pairs abdominal and one pair anal feet, crochets well developed, in closed circles, hooks brown. Anal shield small, hardly chitinous, cinereous. Setæ short. Tubercles: Abdominal segments: i. very slightly dorsad to ii.; iii. dorsad and slightly caudad to spiracle; iv. and v. ventrad to spiracle, close together, vertical to each other, but not on same plate; vi. and vii. in usual positions: Meso-thoracic segment; ia. & ib.; iia. & iib.

*Peoria approximella*, Walk.—One typical specimen; Regina, VII., 20. I am indebted to Dr. Dyar for names of all Phycits.

YPONOMEUTIDÆ.

*Choreutis extrincicella*, Dyar.—One specimen; Regina, VI., 24. Exactly the same as type, can be easily separated from any other species of this genus, by the narrow white transverse line beyond base, and the radiating white lines in outer quarter.

GELECHIIDÆ.

*Gelechia variabilis*, Busck.—One specimen; Regina, VIII., 15.

*Gelechia albisparsella*, Cham.—Three specimens; Lethbridge, VII., 11.

*Gelechia nigrimaculella*, Busck.—One specimen; Regina, VIII.,23.

*Gelechia ornatifimbriella*, Clem.—One specimen; Regina, VI., 18.

*Gnorimoschema triocellella*, Cham.—Seven specimens; Regina, V., 15, to VI., 15.

*Trichotaphe juncidella*, Clem.—One specimen; Regina, VIII., 15.

*Ypsolophus ligulellus*, Hbn.—One specimen; Regina, IX., 2.

ŒCOPHORIDÆ.

*Depressaria argillacea*, Wlsm.—One specimen; Regina, IV., 29.

*Semioscopsis inornata*, Wlsm.—One ♀; Red Deer, IV., 18. This species has also been recently received from Mr. Heath and Mr. Criddle, and fully bears out Dr. Dyar's conclusions (*ante* xxxiv., p. 319), that it is distinct. It more nearly resembles a large gray Geometrid, and seems much out of place in the Micro-Lepidoptera. I believe this is the first record of capture since the original description. In Bul. 52, U. S. N. M., the locality is "unknown."

TINEIDÆ.

*Tineola bisselliella*, Hum.—Two specimens; Regina, VI., 7–8. The common clothes moth.

*Tinea croceoverticella*, Cham.—Two specimens; Regina, V., 29–VI., 3, labelled "in house." I am not entirely certain of this identification.

*Tinea granella*, Linn.—One specimen; Regina, VI., 15. Rather badly broken, but the identification seems good.

Besides the above, there are two or three species that I cannot make out at this time.

Since completing the above notes Mr. Willing has been good enough to send me a large map of a part of the Northwest Territories, from which I add the following to better identify the localities mentioned.

Regina and Indian Head are in the Eastern part of Assiniboia, about the middle of the great wheat belt.

Medicine Hat is in the Western end of the same Province.

Lethbridge, Macleod and Pincher are just above the United States line in the Southern end of Alberta.

St. Albert is the Northern terminus of the Calgary and Strathcona (Edmonton) branch of the C. P. R., and nearly the Northern end of Alberta.

Pine Creek is in Alberta, between Macleod and St. Albert.

From the apparent topography, I assume all of the Assiniboia localities are in the great stretch of prairie land, which likely partially continues into the Eastern half of Alberta; Pincher and Pine Creek are in the lower foot-hills, and St. Albert in the vast forest and lake districts of the Northwest.

## THE GENUS VENUSIA AND ITS INCLUDED SPECIES.

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

If it were necessary to emphasize the need of revision in the Geometrina, the genus Venusia furnishes an excellent example. It was established by Curtis, an English writer, in 1839, with *cambrica*, Curt., as its type. Since that time, three additional species, according to Mr. Meyrick, from New Zealand have been placed under it. In our own fauna, Dr. Hulst placed three species as its representatives—*cambrica*, Curt., *comptaria*, Walk., *duodecimlineata*, Pack. *Cambrica*, the type, has a world-wide distribution. It flies in England, in Northern Europe, across Northern Asia, in Japan, and in the north temperate zone of America. *Comptaria* is found in Canada, the mountainous regions of New England and New York, and along the Appalachian range as far south as Pennsylvania and probably farther; *duodecimlineata* comes from northern California, and with it, under this name, have been associated examples taken in British Columbia; and another series found in the East, ranging from the vicinity of New York City, southward into Pennsylvania and probably into the hill regions beyond. During many years collecting in the Catskill Mountain region, I have never taken it there, while *cambrica* and *comptaria* were abundant.

Briefly, I will state that the chief distinguishing character of Venusia, is the bipectinate antennæ of the males. In the group I have mentioned, *cambrica* is the only species possessing this structure, and it is my opinion, that here, as in Europe, it is the sole representative of its genus. *Comp-*

*taria* has the male antennæ filiform and strongly ciliate beneath, hence its place is in the allied genus Euchoeca, Hüb., with which in other respects it perfectly agrees. *Duodecimlineata* was stated by Dr. Packard to have pectinate antennæ (Monograph of Geometrid Moths, 1876, page 83), where he characterizes the genus Epirrhita, Hüb., under which he places it, but in his description (page 84), he states merely that they are "well ciliated." In both he was correct, but he failed to observe that his species possessed that anomaly in construction, *unipectinate* antennæ, the single row of pectinations beneath, being flanked on either side by a row of cilia, and tipped with a fascicle of hairs, the apex being simple. For some time I tried to convince myself that they should be called serrate, but the pectinations are long and proceed from the centre of each joint, and are not an enlargement of either end. This structure removes it from Venusia, and necessitates the erection of a new genus, since, so far as I am aware, none has been established to cover the requirements found in its construction. I give it, therefore, a name, NOMENIA, n. g., and the species will be known as *Nomenia duodecimlineata*, Pack. It is defined as follows :

NOMENIA, n. g.

Palpi short, slender, scaled ; front rounded, smooth scaled ; tongue developed ; antennæ of ♂ unipectinate, pectinations tipped with a fascicle of hairs, and on each side a row of cilia, apex simple, in ♀ filiform simple, thorax and abdomen untufted ; fore tibiæ unarmed, hind tibiæ with all spurs in both sexes slender, without hair pencil in ♂ ; fore wings, one accessory cell, 12 veins, 3 and 4 separate 6 and 7 from point ; hind wings 8 veins, 3 and 4 separate 6 and 7, long stemmed, 8 with cell to beyond middle.

It seems strange that this species should have passed under the hands of many able observers, and yet that this antennal feature should have been unnoticed, and stranger still that the forms from British Columbia, and from the East, with their simple ciliate antennæ in the males, should have been so long associated with it. These latter are one species, which belongs to the genus Euchœca, Hüb., and is nameless. The ground colour is paler, and, as is frequently the case, the Western form is larger, but aside from this I can find no difference in structure or markings. It will be known hereafter as

*Euchœca salienta*, n. sp.—Of the same form with its congeners, the ground colour of both wings above, pale ashen in Eastern, nearly white in Western specimens, sparingly mixed with dark brown or black scales.

Front broad, rounded, dark brown; above pale ashen. Antennæ compressed, fringed with cilia in ♂, simple filiform in ♀; fore wings crossed by about five fine double lines. Of the first four pair, the fine inner line is black, the other a diffused yellow-brown, the fifth pair being black, and generally consisting of points on the venules, sometimes continuous and waved. A line of black intervenular marginal spots; fringes on both wings white, double, the short scales tipped with dark brown, which forms a dusky streak through the centre. All the lines are angulate outwardly just below the costa, are waved throughout their course, which is nearly straight across to inner margin; sometimes the trend is slightly basal and the lines are heavier and darker at costa and inner margin. The extra discal black line is clearly defined, with a large angle at costa, and an outward curve at end of cell, and its brown shade line is broader, sometimes including two black venular dashes at end of cell, but these are not present in *all* specimens. The discal space is small and paler and between the extra discal shade line and the sub-terminal lines, a clear, pale, line-like space crosses both front and hind wings, following the waving of the preceding lines, terminal space dusky. Hind wings with about four parallel dusky cross-lines, the two inner more distinct and curved out opposite cell, the outer frequently reduced to venular dots; intervenular marginal spots, as in fore wing, terminal space dusky. Discal spots small, obscure, that on hind wings included in basal line. Beneath, more dusky; fore wings with only four outer lines reproduced, all dusky, the pale, line-like space showing through, and continuous as above on both wings, the lines on each side of it heavier and black at costa. Hind wings with all lines reproduced, dusky. A row of black intervenular marginal spots on both wings, terminal space darker, discal spots small, often obscure. Abdomen ashen above, white below; fore legs dark brown, hind legs lighter, all tarsi banded with yellowish-white.

Types ♂ ♀; coll. of R. F. Pearsall.

As compared with *comptaria*, its nearest ally, this species is thinner winged, its ground colour bluish-ash, not clear white as in *comptaria*, and all the lines are finer, not so diffuse, the brown lines especially. The above species should now be listed thus:

Venusia cambrica, Curt.
Nomenia duodecimlineata, Pack.
Euchœca comptaria, Walk.
" salienta, Pearsall.

This paper shows how slowly must proceed any revisional work, and that no section of the group can be thought finished until every species in that section has been studied and compared. I will be much indebted to entomologists, particularly in the West, who will send me material in this order, for it is my desire to make my work as thorough in character as is possible.

## THE TYPES OF THE LATE DR. HULST.

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

I am glad that Mr. Taylor has shown in the Feb. CAN. ENT. that the "types" of *Somatolophia umbripennis* and *Diastictis festa* in the Hulst collection at New Brunswick, N. J., are not the true types. A specimen that contradicts the description cannot be the type, however labelled, unless it can be shown that the author has made an error. I do not think that Dr. Hulst made errors in description in these cases, and I do not think either that the true types were destroyed as Mr. Taylor suggests. More probably they exist in some collection. Will not every reader of this note, who has Hulst types, look to see if he has these species, and if so, kindly communicate with Mr. Taylor or with me? Mr. Doll recently drew my attention to a series of Hulst types in the Museum of the Brooklyn Institute that had been presented by Dr. Hulst. Some were likewise presented to the U. S. National Museum, and perhaps to other collections. In other cases he has no doubt described from borrowed material which was afterward returned.

In the material at Brooklyn I found the "true type" of *Mycterophora Slossoniæ*, the Manitoba specimen. It is congeneric with the other species of *Mycterophora* and has the whitish costal stripe as described. The New Hampshire specimen in the Hulst collection is a *Homopyralis* with the costa denuded, as I have shown. It is not really the type, although so labelled, before Dr. Hulst, when describing, referred to in the description and suggesting the name given. The description was taken from the other specimen.

There exist a number of "types," descriptions of which were not published by Dr. Hulst up to the time of his death; but specimens were labelled, evidently with the intention of description. Some of these names have been allowed to appear in Smith's List of 1903. Of one such there are two "types" in the Brooklyn Museum, under a well-known genus of Geometridæ, which I shall not mention for fear of establishing the manuscript name. The two types are respectively a specimen of *Oreta irrorata*, Pack., from Florida, and one of *Drepana cultraria*, Fab., from Europe, with a false "N. J." label. Comment is superfluous.

April, 1905.

## MOSQUITO NOTES.—No. 3.

BY C. S. LUDLOW, M. SC.,
Laboratory of the Office of the Surgeon General, U. S. A., Washington, D. C.

(Continued from page 102.)

*Stethomyia pallida*, n. sp.—♀. Head light testaceous, a few white flat lanceolate scales on the vertex, otherwise clothed with sparsely set slender hair-like curved brown scales, nearly as long as the very slender fork scales which occur on the occiput; two light brown bristles project forward between the eyes, and a few around the eyes. The head shows no sign of having been denuded, and besides the slender hair-like scales is covered with a short fine tomentum or frostiness, such as is often seen on the thorax of Anophelina. Antennæ brown, verticels brown, pubescence white, basal joint testaceous with frosty tomentum; palpi long and slender, covered ventrally with the short fine hairs of the frosty tomentum, dorsally with small flat brown scales, a couple of bristles or long hairs at the apex; proboscis light brown, covered with very thin flat scales and curved hair-like scales, a few bristles at the base, tip lighter; eyes dark brown; clypeus light, with frosty tomentum.

Thorax light testaceous, sparsely covered with hair-like brown curved scales, and frosty tomentum, prothoracic lobes a little darker, and with curved hair-like scales; scutellum like mesonotum; pleura light, with a few groups of hair-like curved brown scales; metanotum brown.

Abdomen apparently mottled brown and light, but this may be due to drying, and clothed with rather long brown hairs.

Legs unusually long and slender; coxæ and trochanters light, with a few hair-like curved brown scales. Remainder of the legs light, covered with small, thin brown scales, which, in some lights, however, look much darker, with almost purple iridescence, in other lights almost fawn colour. Ungues simple and equal.

Wing clear, brown scaled, with lanceolate scales; the 1st submarginal extremely long, nearly twice as long as the second posterior cell, and a little narrower, the stem about half the length of the cell, and a third shorter than that of the 2nd posterior; cross-veins close together, and all about the same length, the supernumerary about half its length interior to the mid, and the posterior about its own length interior to the mid. Halteres, stem light, knob dark.

Length, 3.5 mm. (legs more than 10 mm.)

Habitat.—Camp Stotsenberg, Angeles, Pampanga, Luzon, P. I. Taken Sept.? "Caught in the woods."

Described from one very perfect specimen sent by Dr. Whitmore in the collection referred to below.

In spite of the fact that the prothoracic lobes are not mammillated, and indeed seem stalked, the other characteristics point so strongly to *Stethomyia* that I have decided to put this insect under that genus.

HEIZMANNIA, nov. gen.

Head covered with broad flat scales; thorax with flat spindle-shaped scales, very broad on the lateral thirds of the mesonotum; scutellum with broad flat scales; metanotum with large median bunch of chætæ (not less than 16–20) on caudad half; wing scales somewhat resembling Tæniorhynchus scales, but the median scales at times inclined to be asymmetrical. Cells small. Ungues in female simple and equal.

This genus evidemtly lies near *Dendromyia*, Theobald, but Mr. Theobald says it cannot be included under that genus, the large bunch of bristles on the mesonotum being too marked a characteristic, and I therefore give it a place by itself.

It is named after Col. C. L. Heizmann, Asst. Surgeon-General, U. S. A., whose continued interest in and effective support of this research, extending over several years, have been invaluable in making possible such success as has been attained.

*Heizmannia scintillans*, n. sp.— ♀. Head brown, with brown flat, iridescent (peacock blues and greens) scales, heavy white rim around the eyes, and a white spot between the eyes (at point of vertex), brown bristles projecting forward; antennæ mostly gone, basal joint brown, with short fine hairs on the median side; palpi brown; proboscis brown; a few bristles at the base; eyes brown; clypeus brown.

Thorax brown; mesonotum densely covered with dark flat, broadly spindle-shaped iridescent scales; prothoracic lobes heavily covered with broad flat, white scales; pleura brown, thickly covered with broad flat, white scales; scutellum brown, densely covered with broad flat, brown iridescent scales; metanotum rich brown, with heavy median bunch of brown bristles (not less than 16–20) on caudad half.

Abdomen dark, densely covered with broad dark (almost black) flat iridescent scales; the venter with broad white bands, very broad on the cephalic segments, which extend so far around as to appear from the dorsal aspect like basal lateral white spots.

Legs, coxæ and trochanters light; femora of hind legs ventrally light, less so on the other legs, and otherwise the legs are dark brown; metatarsi and tarsi of fore and mid legs in some lights are almost a fawn colour; hind tarsi are missing. All the ungues equal and simple.

Wings clear, with heavy brown scales resembling those found in *Tæniorhynchus*, but the median scales, especially on costa, subcosta and 1st longitudinal veins, heavier and inclined at times to be asymmetrical; cells short; 1st submarginal a little longer, and about the same width as 2nd posterior cell, the stems a little shorter than the cells; supernumerary and mid cross-veins are about the same length, and meet the posterior cross-vein a little longer, and one and a half times its length distant. Halteres have white stem and knob dark.

Length, about 4 mm.; proboscis, 2 mm.

Habitat.—Camp Stotzenberg, Angeles, Papanga, Luzon, P. I. Taken Sept. ?

Described from one specimen, perfect except as to the antennæ, sent by Dr. Whitmore.

*Anisocheleomyia ? albitarsis*, n. sp.—♀. Head brown, covered with very large, long flat scales, so loosely applied as to make the head look shaggy, a wide median white stripe extending from occiput to vertex, a few white scales and two brown bristles projecting forward between the eyes, a narrow white line around the eyes, the scales long and flat and projecting forward over the eyes, also some brown bristles; laterad to this broad median stripe is a broad, brown stripe, a narrow white stripe, a narrow brown and another narrow white stripe, all of the long flat loosely set scales. Antennæ brown, verticels and pubescence brown, first joint short and somewhat distended, and clothed with a few flat brown scales, basal joint brown, heavily scaled with rather large flat loosely applied white scales; palpi brown with white tips, the scales being unusually long, and square ended; proboscis brown scaled; clypeus brown; eyes brown, and the shaggy appearance of the head makes them seem extremely small, so that instead of being the larger part of the head, they are quite insignificant.

Thorax dark brown; prothoracic lobes covered with large white flat scales, much like those on the head, and some brown bristles; mesonotum brown, covered with brown and white curved scales, those on the cephalic and median parts very slender, almost hair-like, those at the sides and towards the scutellum broader, a narrow line of white scales running cephalad from one wing joint to the other (an inverted "U"), a median line connecting with it at the cephalad end, and extending to the scutellum, two short lines from the scutellum cephalad; pleura brown, with heavy bunches of broad long flat white scales arranged in rows; scutellum brown, deeply trilobed with large long flat scales closely set on each lobe so that they appear tufted; metanotum rich brown, bare.

Abdomen brown, covered with brown scales, and narrow white basal bands on most of the segments, lacking on the first and last three segments, which latter, however, have narrow lateral white spots, the continuation of the ventral marking. The ventral marking is rather peculiar. The proximal segments being mostly white scaled, with only narrow brown apical bands, but the last three segments are largely brown scaled, a narrow white line starting at the median line of the base of the antepenultimate, running sharply laterad and then caudad, forming the lateral white spots of the three last segments noted above; apical brown hairs, apparently much more numerous on the antepenultimate segment.

Legs all brown, with more or less white at the bases; coxæ and trochanters testaceous with white scales; fore femora dark brown, a narrow white line on the ventral side extending from the base to near the apex, where there is a white spot on ventral and lateral aspect, not appearing on the dorsal aspect; tibiæ brown, a very narrow white band a little proximal of the middle, on the cephalic aspect; metatarsi and first tarsal joint basally light banded, second, third and fourth joints brown; mid femora light at the base, a distinct white spot about midway and an indistinct white spot interior to this, both on the cephalic aspect, also a brilliant white spot at the apex; tibiæ brown, with a white band about midway, metatarsi and 1st tarsal joints have white basal bands, the rest of the tarsi brown; hind femora brown, white at base and nearly two-thirds its length, and apex white (femora therefore mostly white); tibiæ brown, with median white band; metatarsi and first and second tarsal joints with heavy basal white bands, the last two joints pure white. The ungues on fore and mid legs, though equal and simple, are much heavier than are usually found on any mosquito of this size, the hind ones markedly smaller, but, having only one specimen, I have not dissected it, so that while fairly sure that it belongs to *Anisocheleomyia*, Theobald, it is impossible to state definitely the peculiar shape of the ungues. It is, I think, quite certain, however, in spite of the flat scales on head and scutellum, it is not a *Stegomyia*.

Wings clear, brown scaled, the scales very large, and of the Tæniorhynchus type, but a little inclined to asymmetry; cells short; 1st submarginal cell nearly a half longer and a little narrower than the 2nd posterior, the stem of the former about a third shorter than that of the latter; supernumerary and mid cross-veins equal and meet, posterior cross-vein also about the same length, and distant from the mid a little more than twice its own length; halteres light stem, with dark knob.

Length, 2.5 mm.

Habitat.—Camp Stotsenberg, Angeles, Pampanga, Luzon, P. I. Taken Sept.?

Described from one perfect specimen sent by Dr. Whitmore.

While the flat scales suggest *Stegomyia*, the general appearance of the insect is quite against it, the shaggy head bearing no resemblance to the neat appearance of *Stegomyia*. It is a small mosquito, and the scales on the head, scutellum and wing out of all proportion to the size of the insect, giving it a generally ragged look, so that though I have not been able to demonstrate the peculiar ungual features of *Anisocheleomyia*, I feel fairly sure it belongs to that genus.

*Tæniorhynchus lineatopennis*, n. sp.—♀. Head dark brown, with brassy yellow curved scales on median portion and extending from occiput to vertex, light bristles projecting forward, dark brown flat lateral scales, and a few forked scales, some light and some dark, on the occiput; antennæ dark brown, verticels dark brown, pubescence also dark, but appearing light in certain positions, basal joint brown; palpi dark brown, and quite hairy; proboscis dark brown; clypeus dark brown; eyes brown and silver.

Thorax: prothoracic lobes dark brown, with a few dark brown bristles, no scales; mesonotum dark brown, the median portion covered with dark brown curved scales bordered by a heavy band of brassy yellow curved scales, extending cephalad from one wing joint (inverted "U") across to the other, a very distinct and easily-recognized marking. The brown curved scales on the mesonotum near the scutellum appear in some lights white, and this seems characteristic of the brown scales all over the insect; pleura brown and clothed only with a few brown hairs; scutellum dark brown, with brassy yellow curved scales and a few light bristles; yellow bristles at the wing joint, and two sparsely-set rows on the mesonotum; metanotum dark brown.

Abdomen dark brown, with broad basal bands of "dirty white" scales hardly extending the full width of the terga; the first segment is dark, and the second has merely a median light spot, while on the ultimate segment the band is quite narrow; venter dark.

Legs are brown throughout; coxæ and trochanters and ventral side of femora somewhat lighter than the rest, a light spot near the apex of fore femora on dorsal side, *i. e.*, the ventral colour runs up, but all the scales show much change of colour in different lights; the tibiæ and more distal joints are darker, ranging from purplish to fawn colour, according to the angle of the light, and under hand lens may seem even brassy. All ungues simple and equal.

Wings clear, clothed with brown and light typical *Tæniorhynchus* scales. The costa is dark throughout, the subcosta and first longitudinal are mostly light scaled from the base of the wing to about the junction of the subcosta, and the stem of the fifth long vein is also light, with some light scales on the lower fork. The scales vary much in different lights, the colours ranging from a gray to "dirty white" to brassy yellow, and the effect is of two light diverging lines on the wing; fringe dark, turning gray in some lights; 1st submarginal is a fourth longer and a little narrower than the 2nd posterior; the supernumerary cross-vein about half as long as the mid, which it meets, and the posterior cross-vein about half as long as the mid, and distant twice its own length; halteres have a light stem and dark knob.

Length, 3.5 mm.

Habitat.—Camp Gregg, Bayambang, Pangasinan, Luzon, P. I. Taken Sept. 13, 14, marked "inside screens of screened house."

Described from two perfect specimens sent by Capt. Chamberlain, Surgeon, U. S. A.

This collection of Dr. Whitmore's is interesting in many ways, for all the specimens showed great care in preparation and extremely good differentiation. In only two boxes were there more than one kind, and the only badly broken specimens were in places where the insect had been caught in tying up the small pieces of tubes in gauze; one extremely small mosquito was so much denuded as to be quite impossible to place, but otherwise the collection was in remarkably good shape, and contained, besides the genera and species above described, the following previously known forms:

*Finlaya poicilia*, Theobald. "Bred from larvæ taken from banana trees."

*Mansonia uniformis*, Theobald. "Caught in the Quarters."

*Mansonia annulifera*, Theobald. "Caught in the woods, Hospital and Quarters."

*Desvoidea obturbans*, Walker. "Bred from large larvæ taken from under overhanging rock, in a deep pool of a clear running stream. Larvæ resemble overgrown Anophelina larvæ, and are very cannibalistic."

*Desvoidea fusca*, Theobald. "Bred from larvæ taken from the water-filled joints of bamboo poles in the fence."

*Stegomyia scutellaris*, Walk., var. *Samarensis*, Ludlow. "Caught in the woods and Quarters."

*Stegomyia nivea*, Ludlow. "Caught in the woods."

*Stegomyia fasciata*, Fabr. "Caught in the woods and Quarters."

*Myzomyia funesta?* Giles. Caught in the woods, Hospital and Quarters."

*Myzomyia Rossii*, Giles, var. *indefinita*, Ludlow. "Caught in woods, Hospital and Quarters." Very common.

*Myzorhynchus barbirostris*, Van der Wulp. "Caught in the woods, and rarely in the Quarters."

*Myzorhynchus pseudobarbirostris*, Ludlow. "Caught in the woods, and rarely in the Quarters."

*Pyretophorus Philippinensis*, Ludlow. "Caught in the woods, and rarely in the Quarters."

*Culex gelidus*, Theobald. "Caught in the Quarters."

*Culex microannulatus*, Theobald. "Caught in the woods."

*Culex annulifera*, Ludlow. "Caught in the woods."

So far as the taking of the Anophelina is concerned, Dr. Whitmore's experience is quite different from that of Dr. Chamberlain, Capt. Asst. Surg. U. S. A., at Bayambang, Pangasinan, who takes *Myzomyia funesta?* Giles; *Myzomyia Ludlowii*, Theob.; *Myzomyi Rossii*, var. *indefinita*, Lud.; *Myzomyia Rossii?* Giles; *Myzorhynchus vanus*, Walk.; *barbirostris*, Van der Wulp; *pseudobarbirostris*, Lud.; *Pyretophorus Philippinensis*, Lud.; and *Nyssorhynchus fulginosus*, Giles, in great numbers, both in and around the Quarters and Hospital, sending very suggestive collections of these from the bed nets of patients, while Dr. Whitmore apparently finds them mostly away from houses, *i. e.*, in woods and banana groves.

[ERRATA.—On page 94, line 6, for "a couple" read "some"; line 12, for "palpi two-jointed" read "palpi four-jointed, the first joint very short and the last minute"; page 97, line 4, for "white" read "light"; page 98, line 9 from bottom, change ";" after "legs" to ","; and page 100, last line but one, for "above" read "below."]

## THREE NEW COCCIDÆ FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLO.

A series of tables for the identification of Rocky Mountain Coccidæ has been prepared for publication by the University of Colorado. Even now, while these tables await publication, I find myself obliged to add three new species, found here at Boulder; two of them representing genera new to our region. It is a rule of the University of Colorado publications that new species shall not appear for the first time therein, so I present herewith brief diagnoses of the three forms just mentioned.

*Eriopeltis Coloradensis*, n. sp.— ♀. Dark brown (colourless after boiling in liquor potassæ), forming a pure white ovisac 10 to 12 mm. long, of the form usual in the genus, compact, without any conspicuous filaments extending from its surface; antennæ and legs very minute; antennæ 8-jointed, joints 1 and 3 large but variable, 2 always very short, more than twice as broad as long, 4 to 7 all broader than long, 8 with several bristles; skin with truncate glandular spines as in *E. festucæ*, but they are not nearly so numerous, and seem generally shorter; anal plates much longer than broad. Length of mounted ♀ about 6 mm., breadth about 3.

On stems of grass, Boulder, Colorado, November, 1904. The exact locality of this and the *Trionymus* is the meadow in front of 930, 14th street.

*Trionymus nanus*, n. sp.— ♀. Very minute, elongated and rather parallel-sided, hardly 1½ mm. long, and about three-fifths mm. broad; very pale yellowish, antennæ and legs very light reddish, antennæ not extremely close together; secretion yellowish. Antennæ 7-jointed; tibia a little longer than tarsus. In potash the females turn light yellow.

Under a rock, presumably feeding on the underground parts of grass, Boulder, Colorado, Nov., 1904. Three found by W. P. Cockerell. The specimens evidently represent the early adult; after the eggs are formed they will no doubt be larger.

*Orthezia olivacea*, n. sp.— ♀. Length about 2½ mm., with cauda rather over 3 mm.; legs and antennæ reddish-brown. Body entirely covered with dense white secretion; dorsal line marked by a deep groove, with no median tufts; the two dorsal rows of lamellæ thick and obtuse, the first pair overlapping head, but not projecting far forwards; area between dorsal and lateral lamellæ covered by secretion; lateral lamellæ broad, the anterior three truncate, the others more pointed, the points curved inwards; caudal lamellæ surpassing last lateral ones, but not very long. Body denuded of lamellæ dark olivaceous. Antennæ (so far as seen) 7 jointed, joints 1, 2 and 3 subequal, but 2 the shorter; 4, 5, 6 shorter and subequal, but 5 somewhat the longer; 7 about as long as 4 + 5 + 6. Immature forms similar in appearance, but antennæ and legs rather light reddish, last joint of antennæ conspicuously darkened.

Boulder, Colorado, in nests of *Lasius* under rocks, Nov., 1904 (W. P. and T. D. A. Ckll.). Also found formerly in nests of *Lasius* at Trout Spring, New Mexico, April 27. The following measurements in $\mu$ are from the Trout Spring material: Antennal joints: (1) 96, (2) 78, (3) 90, (4) 48, (5) 48, (6) 39, (7) 129; knife-blade-like spine on the end of last joint 18 long; middle leg, tibia 225, tarsus (excluding claw) 195. Easily known from *O. lasiorum* by the colour of the body and the absence of the long tail in the immature forms.

## PRACTICAL AND POPULAR ENTOMOLOGY.—No. 4.

### Notes on Collecting, Preserving and Rearing Aquatic Hemiptera.

BY J. R. DE LA TORRE BUENO, NEW YORK.

I suppose that in due course I shall acquire much *les* and honour and not a little fame for harping in season and out of season to the tune of "Waterbugs." But I shall feel that my labours have not been in vain if by so doing I can induce others to launch themselves on the study of these forms, which are in many respects the most interesting and easily observed and collected of the Heteroptera. In these families much remains to be done. The classification is still more or less imperfect; new species are almost certain to be found and old and forgotten ones rediscovered; and the life-histories of all still remain to be worked out in detail.

The Waterbugs may roughly be divided into two sections: The Cryptocerata, in which the antennæ are nearly or quite concealed, which includes the families Corixidæ, Notonectidæ, Nepidæ, Belostomidæ, Naucoridæ and Gelastocoridæ, all of which, except the last, are swimmers and live in the water; and the Gymnocerata, which includes the Water-striders of the families Hydrometridæ, Gerridæ and Veliidæ, to which may be added the Acanthiidæ (=Saldidæ), all of which, except the last, walk or row themselves on the surface of the water.

Of course, the necessary apparatus for collecting consists of one or two suitable water-nets, cyanide bottles of several sizes, tight tin boxes for living specimens, and perhaps a pair of rubber boots for wading when necessary. The net I use is made of coarse Brussels net, so I am told, which is very strong and stands a good deal of rough usage, in addition to being very manageable when in the water. The size may vary to suit the individual preferences of the user. One about eight inches in diameter is very convenient, as it can be pushed into little nooks and crannies. The ring should be of rather heavy soft steel wire. Of course, any other approved net will do, but it must be strong enough not to come to pieces when it strikes a submerged branch or point of rock. The stick should be quite long—about five feet—to give a good reach. The cyanide bottles should be of several sizes; small ones for the delicate Velias, Hydrometra and the Acanthias; medium size for the Notonectas, larger Corixas, and Nepas; and quite large for the Belostomas, Ranatras and larger Water-striders. On no account should any aquatic bugs be killed in alcohol, as

in general it distorts and discolors them and seems to tend to make them greasy when they dry in the boxes.

Corixas are to be found in running streams, clinging to the bottom, and in quiet ponds, hiding among the vegetation. In the former situation, it is an easy matter to follow them with the net; in the latter, they are taken by *sweeping* the grasses and weeds, dragging the net through them. There are very many species of this genus, and they can be found abundantly wherever there is water, even though it be nothing more than a temporary pool. The Notonectidæ, Naucoridæ and Belostomidæ also can be taken by sweeping the vegetation at the edges of quiet waters. The first named family, however, can be captured by moving the net swiftly just below the surface when the bugs are seen there. They are more likely to be found close to the shore, and some species hide in the tangles of roots and grasses growing from them. The genus Buenoa (= Anisops) is generally to be found floating below the surface in clear spaces. *Pelocoris femoratus*, said to be our only Northern Naucorid, is found in great abundance when present, hiding in the water-weeds. The Belostomas, great and small, also seek similar situations, or else hide in the mud in rather deep water. Nepa and Ranatra require more particular treatment. The former is found in quite shallow water, not much over two or three inches deep, concealed in the mud, or else in situations where grasses grow out of the water, clinging together. Of course they must either be taken out with the mud and twigs and dead leaves, among which they lie hid, or else the grasses should be gone over several times with the net to disturb them and make them float into it. Ranatra, on the other hand, frequents deeper waters and clings to the stems of rushes and grasses that rear themselves into the air, thrusting its breathing tube through the surface. Here the net must be moved strongly back and forth a number of times among the stems. This repeated sweeping is necessary, as both these Waterbugs cling tightly to their supports and they are not readily dislodged. The semi-aquatic Gelastocoridæ wander in damp situations looking for their prey. They are ordinarily to be found in muddy or pebbly damp spots, generally on the banks of streams or ponds. The best way to catch them is to clap your net over them when you see them move, and then pick them out with your fingers to put them in the bottle. Acanthias can be found and captured in the same way. I always endeavour to put the mouth of the bottle over these, as they

will ordinarily jump right in, thus avoiding touching them, which is apt to damage these delicate little bugs.

Great care must be taken in handling the Cryptocerates, because they have sharp and powerful beaks, which they use with taste and discretion. They produce an extremely painful and lasting impression.

The Water-striders require different methods. These bugs walk or glide over the water as if it were a sheet of ice; the smaller ones frequent floating water-lily leaves or the matted masses of duckweed, from which they sail out into the clear water on predatory excursions. Others, again, hide among the vegetation growing from the banks or among the stems of rushes or grasses, where the Marsh-treaders also lie low. One form loves the braiding ripples of streams, while others gather in multitudes on the calm surfaces of lakes, not far from the shores. The winged forms of all these should be diligently sought for and very carefully preserved. The Gerridæ in general afford much sport. They are wary and swift, and it is necessary to approach them very cautiously and then scoop them up with a sudden dash of the net, which should just brush the surface. The smaller ones are more apt to hug the shore than the larger, and they can be taken in a similar manner as they glide away. These may be headed off with the net also. Trepobates, Metrobates and Rheumatobates frequent the still waters of large ponds and lakes or the quiet parts of broad and slow streams. Rhagovelia is found in the swift streaks in streams, or in the eddies around rocks jutting into the air, zigzagging against the current. All occur in schools, and being extremely shy and quick in motions, must also be scooped up with a sudden dash. It should be borne in mind that the absence of wings may cause them to be mistaken for nymphs. Mesovelia and the Microvelias are to be found running about on the muddy, sloping banks of streams or still waters, or wandering over floating vegetation. I have found the best way to take them is to drive them to a clear space and there scoop them up with a small hand net. Hydrometra also frequents the shore vegetation of quiet, shallow ponds or marshes. These last bugs may sometimes be found in the net after sweeping it through rushes, but ordinarily they rush out from their shelters on being alarmed; and, being rather slow of motion, they are best taken up singly with the fingers.

Now, as to methods of preservation. As before stated, alcohol is inadmissible as a killing medium, but there is nothing better for preserva-

tion for anatomical and histological purposes. The *dead* bugs should be put in about 75% alcohol, with some punctures made with a needle at the membranous parts and body-joints in order to allow the preservative fluid to enter the body-cavity, otherwise it will not penetrate and the "innards" will decay, bloating and distorting the specimens for any purpose. Formaldehyde, while an excellent preservative for tissues, according to my observation, hardens specimens too much and makes them too brittle. For the cabinet, they should be mounted while fresh, and in this way the Waterbugs preserve their natural colours much better. If this be not possible at the moment, they should be allowed to dry partially and put in layers in cotton, between sheets of soft tissue paper. The Velias, however, and in general, the smaller Water-striders should be put in alcohol, which, by keeping them flexible, preserves the antennæ and legs unbroken. The larger bugs should be pinned through the scutellum ; the smaller, including Plea, Buenoa, Hydrometra and the more minute Water-strider, are best mounted on points. Of course, the usual locality and date label should not be omitted, and it is also well to make field notes on habits, or the conditions under which the bugs were found.

One of the most interesting and profitable features of collecting Waterbugs is the excellent opportunity they offer for observation and study. As water is necessary for their comfortable existence, it is a simple matter to confine them in an aquarium and with care to preserve them to a hoary old age. For collecting the living insects, I have found nothing better than a dry tin box and in it enough excelsior, much pulled out and separated, to give the bugs something to cling to and to prevent them from coming together in a mass at one end of it, which is fatal. As they are air-breathers in all stages, water is not necessary in carrying from the field to the aquarium ; on the contrary, it is very harmful, and even excessive dampening of the excelsior in the box may have bad consequences. The best for the purpose are those soldered and hinged tin boxes in which fifty or one hundred cigarettes are packed. They are of a very convenient size to carry in the side pocket of a coat. Several should be carried when out collecting, in order not to be obliged to crowd too many bugs into one box. Belostomas should never be put in the same box with other bugs, because, being bigger and heavier, they are apt to hurt them. For the little Water-striders nothing is better than a small test tube lined with

blotting-paper and containing a few threads of excelsior and a little wad of it at the bottom.

The best aquaria are the ordinary round glass ones, or battery jars of different sizes. For the Water-striders, those giving quite an extensive surface of water are the best; for the Cryptocerates, the water is better deep. Microvelias can be very well kept in jelly-glasses or any other of the thousand and one glasses or earthenware receptacles in which eatables are put up; the shallower and wider-mouthed they are, the better. All these aquaria must be covered with pieces of glass to keep dust from falling in and to prevent the water from evaporating and the bugs from escaping. The Velias should have Duckweed to rest on. The others should have some sort of vegetation in the water, partly to preserve it sweet, partly to give the swimmers something to cling to and on which to deposit their ova, should they breed. For food, flies (Musca) answer every purpose. It is better to feed them living or freshly caught, although the hungry bugs will feed on them even a day or two old. Just throw them in and the bugs will do the rest. ON NO ACCOUNT FEED THEM INSECTS KILLED IN THE CYANIDE BOTTLE. These are deadly. Nor is it safe to put Water-striders in the same aquarium with Notonectas, Nepa, Ranatra, Pelocoris or Belostomas of any kind. They do not last long under these conditions. Neither should Notonectas and Corixas be put together; nor, in general, any bug with others smaller. The last will merely be a feast for the larger brethren. Even those of one species will destroy each other when driven to it by hunger.

The best times of the year to collect Aquatic Hemiptera are the Spring and Fall. As soon as the ice disappears from the ponds and lakes and streams, the larger Water-striders can be seen in abundance, the Corixas and Notonectas arouse themselves from their Winter's sleep, and Pelocoris, the Belostomas, Nepa and Ranatra leave their muddy Winter quarters and once more actively commence the real business of life—the propagation of their kind. From March until the end of May or the beginning of June, over-wintering adults of all the species may be found. After that, only the young abound, till August, when the season's brood of adults begins to appear. Collecting now continues good until the water gets too cold toward the end of Autumn. I have taken these families in this latitude as early as the middle of February and as late as the end of November. In the South, they are apparently obtainable at even later

dates, until in Arizona, California, and the Southwestern United States and thence South, they can be taken at all times of the year. One day is just as good as another for collecting. Sunshine and storm in no way affect the bugs, except those that walk on land (the Gelastocoridæ and Acanthiidæ), which seek shelter. When there has been but little rain and the ponds have evaporated to reduced areas, collecting is much better, as then the bugs are, so to say, more concentrated. After severe storms they are usually much scattered and less easily obtainable, because of the greater volume and area of their haunts. Yet even in these conditions, favourite nooks are found in which they fairly swarm.

In conclusion, I would say that this is merely the general outline of the methods that I have found useful, and I trust it will help others, as some such directions as these would have helped me when I commenced to collect aquatics. Each species requires slightly different methods; their haunts vary in character ever so slightly; the manipulation of the net has to be suited to the peculiarities of each. In the limited space at my disposal, it is impossible to give a cross between a check-list and a dissertation on habits, even were it desirable, which it is not. Therefore, each collector must observe closely to become expert. This is only the guide-post; the collector does the walking. If any of my readers would like further assistance, a letter to me will bring in return whatever may be in my power to give. (Address: 25 Broad Street, New York).

## A NEW PEZOMACHUS FROM ITALY.

BY WILLIAM H. ASHMEAD, M. A., D. SC.

In a recent sending of parasitic Hymenoptera, bred by Dr. Filippo Silvestri, at the Laboratorio di Entomologia Agraria, Portici, Italy, sent me for names, I find a new Pezomachus, represented by both sexes.

*Pezomachus Silvestrii*, new species.—♀. Length, 2.6 mm.; ovipositor a little longer than the petiole of the abdomen. Black and shining, impunctate except a feeble shagreening on the pleura; the metathorax is rounded off posteriorly, and *without* a trace of a transverse carina; antennæ 21-jointed, the fourth joint a little shorter than the third, the flagellum brown-black, the extreme apex of the pedicel, or second joint of antennæ, yellowish; legs black, with the sutures of the trochanters, the apical third of front femora, front tibiæ narrowly at base and more or less beneath, and base of first joint of tarsi, testaceous, the rest of tarsi fuscous or brownish, but a little yellowish at sutures of the joints; hind tibial spurs white.

April, 1903.

♂.—Length, 2.5 mm. Black, not so shining as in the female, and finely shagreened; second joint of all trochanters, apex of front femora, front tibiæ, an annulus at base of middle and hind tibiæ, and all tarsi more or less, testaceous, the basal joints more or less yellowish at base and at their extreme tips; metathorax with delicate carinæ, indistinctly areolated. Wings subhyaline, a faint cloud in the region of the basal and transverse median nervures, and at the apical third of the wings, the large triangular stigma and the veins being brown, the parastigma and the extreme base of the stigma being white; the marginal cell is rather short, triangular, not longer than the stigma; the areolet is pentagonal in position, but open behind; the transverse median nervure in the hind wings is straight, but broken by a vein *below* its middle, or near its basal third.

Types.—Cat. No. 8262, U. S. N. M.

Hab.—Portici, Italy (Dr. Filippo Silvestri).

This species falls in Förster's Monographie der Gattung Pezomachus (Grv.), Sec. A., pp. 1–33, but is quite distinct, in colour and sculpture, from any of the species characterized in this work.

## A NEW SPECIES OF XYLINA.

BY HENRY ENGEL, PITTSBURG, PA.

*Xylina nigrescens*, sp. nov.—Two males and one female.

Upper part of head and thorax stone-gray, front of head light brown, surmounted by a well-defined umber-brown line beneath base of antennæ. This line is continuous along lower margin of patagiæ and very contrasting from the gray thorax. The thorax is rather short and square. Thoracic vestiture intermixed with flattened hair. Thoracic crest slightly raised and defined by a patch of dark brown hair. Collar with a faint line near tip, not contrasting. Palpi are reddish-gray, strongly marked laterally with an umber-brown line outwardly. Antennæ brown, almost smooth in female, shortly ciliated in the male. The male antennæ are very little thicker than in the female, ciliations gray and contrasting. Basal part of antennæ covered with gray scales. Ground colour of primaries ash-gray. A faint tint of green noticeable in one male. The orbicular and posterior third of primaries show the gray colour. The rest of the wing is obscured by dense, glossy black. The basal dash is obvious, curved toward costa, marked with brown scales at the end. Basal part of costa deep black and basal line not visible. T. a. line faintly indicated, curved outward. T. p.

line contrasting from ground colour, curved outwardly, then lost in the black suffusion opposite lower end of reniform. The suffusion extends to costa between the ordinary spots. Posteriorly it encloses lower part of reniform and ends in a blunt spur nearly reaching to s. t. line. The s. t. line is indicated by brownish spots in the interspaces, best marked opposite cell and near submedian vein. A row of terminal black spots, clearly defined. Terminal space mottled with black, most pronounced near hind angle and opposite cell.

Fringe of primaries dark gray. Reniform almost square, clearly defined basally, marked with brown and black. Orbicular gray, faintly centered by a brown dash, strongly contrasting from the deep black, open to costa, intermediate space to costa concolorous with orbicular, somewhat broadening at costa. Claviform is indicated in all three examples by a feeble oblong ring, marked with a few gray scales in outer end. Abdomen gray, strongly tinged with carmine, most prominent on under side. Secondaries smoky, intensified along outer margin, terminus clear-cut, fringe gray, concolorous with base of secondaries. On under side primaries are strongly tinged with carmine along costa and outer margin, otherwise smoky-gray. Discal spot fairly evident, dark gray. Secondaries tinged all over with carmine, exterior line well marked, smoky. Discal spot dark gray.

Expands: 35–40 mm.

Habitat.—West Liberty, Allegheny Co., Pa., Oct. 25, Nov. 19 and Nov. 20, 1904. Taken at "sugar." Coll. Engel.

This species is allied to *querquera* and *viridipallens* in general habitus. These two species were compared. *Xylina Baileyi* is also closely allied to this group according to the description; I have only seen it in the figures given in the "Moth Book" and in the revision of the genus Xylina by Prof. John B. Smith. *Nigrescens* is at once removed from all the allied species by its primaries being intense iridescent black for two-thirds of the wing from the base. It is a most strikingly marked kind. With the wings folded and the gray thorax and apical part of the primaries strongly contrasting, it is easy to notice on the "sugar" patch under the glare of the lantern. A fourth example was taken by Mr. Merrick at New Brighton, Pa. Taking the constancy of these four specimens as a basis, I do not hesitate to give it a name.

# PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 60.)*

267. *Euxoa nesilens*, Smith (Jour. N. Y. Ent. Soc., XI., 192, Dec., 1903).—Described from Calgary and from Brandon, Man. The type is a Calgary specimen in Prof. Smith's collection, and a ♀ co-type is in my own. The description says: "In general appearance it resembles *silens*, but does not have the black basal streak, nor the blackish suffusion between the ordinary spots. On the other hand, it does have more complete, better marked median lines . . . Its distinctness is clear, and its association is with *basalis*, from which, however, it differs obviously in colour." The reference to *silens*, implied also in the name, should probably have been to *tricticula*, which at that time he looked upon as a synonym of *silens*. In general type of maculation its association may be with *basalis*, but at the same time it is not in the very least degree like it. It has the gray colour of *tristicula*, but unlike that species, has generally a distinct yellowish powdering. A good series of Calgary *tristicula* shows a tendency in that species to lose the black markings, and conversely, in a series of twelve *nesilens* there is a tendency to develop black before and between the stigmata, but no sign whatever of a basal streak. The yellowish powdering is not always evident, and though the transverse lines above referred to are a noticeable character in the series, they are not a reliable guide. As regards the basal streak, I may use *ochrogaster* for comparison. In none of my twenty-one examples of that species in series (1) *(vide infra)* is there any trace whatever of any of the black markings referred to, and all are obvious in the ten specimens under (1a). Yet I understand from Dr. Fletcher that both forms (1 and 1a) have been bred from the same female. I tried to call Prof. Smith's attention to *nesilens* as being distinct from *tristicula* (then known as *silens*) ten years ago, but shortly prior to its description proffered my doubts on the subject. I dare venture no definite opinion at present. Rare, at any rate of recent years. July and August.

268. *E. ochrogaster*, Gn.—Nearly always common, sometimes abundant, and the commonest "cutworm" in gardens. One of the most variable species known to me, some forms being decidedly handsome.

ERRATUM: On page 56, line 17 from the top, "No. 248" in the note on *E. pleuritica* should be "249."

April, 1905.

Prof. Smith tells me that I have "every form of the species which has received a name." I divide the species into four series as follows, and have nothing that I can call an intergrade between any two of them:

1. Ground colour red. (*Ochrogaster*, Guen.).

1a. Ground colour red, with black basal streak, claviform and discoidal cell. (*Gularis*, Grote).

2. Ground colour ochreous.

2a. Ground colour ochreous, ditto as above. (*Turris*, Grote.)

Some of (2a) have a distinct darker central band, scarcely traceable in any of the other series. The variation in each series by itself, both in colour and maculation, is enormous. Form (1a) seems to be the least common. I never questioned the unity of the forms, perhaps taking it rather for granted that such a common and widely-distributed species must have been carefully bred long ago, but quite recently Prof. Smith wrote to me, "I am beginning to seriously doubt the identity of all the forms placed under the same name." Incidentally he expresses the same doubt concerning *perexcellens*. End June to September.

269. *E. Idahoensis*, Grt.
270. *E. furtivus*, Smith.
} Rather common at treacle some seasons, but rare of late years till 1904. End June to August.

I am fairly well satisfied that I have two closely-allied but distinct species, standing under the above names, and both Prof. Smith and Sir George Hampson confirm my belief that they are the two species indicated. I think I have them properly separated as species, but whether I have them under the right names or reversed is a more open question. I have had no opportunity of seeing the original descriptions, and in all other attempts to correctly place them I meet with confusion everywhere. Briefly described, my two series are as follows (I mention merely the distinctive features):

*Idahoensis*, eight ♂ ♂ and seven ♀ ♀. Pale reddish-brown or gray-brown, the darkest specimen having something of a purplish tinge. Costa, clear gray; collar of same, or nearly same colour as costa, with a black line. Discoidals uniformly concolorous with costa. A series of black sagittate dashes preceding s. t. line, in most of the specimens extending more than half way to t. p. line. In one specimen only there is scarcely a trace of these dashes.

*Furtivus*, fourteen ♂ ♂ and twenty ♀ ♀. A slightly shorter winged species. Costa gray, sometimes clear, but generally tinged with reddish-

brown, especially on extreme edge. Collar never as pale as costa, generally unicolorous with thorax, generally with a black line, but this is sometimes scarcely traceable. Discoidals outwardly of same colour as palest part of costa, but nearly always darker inwardly. In more than half the specimens there is a series of black sagittate dashes preceding the s. t. line, but only in one specimen do they extend more than half way to t. p. line. In the rest of the specimens these dashes are either entirely absent or discernible by a dusky shade only.

As a whole my *Idahoensis* is a slightly longer and narrower winged species, runs paler in colour, and when dark tends to purplish, sprinkled with gray, rather than to red-brown, and the s. t. dashes are more often present and then longer and sharper than in *furtivus*.

My *furtivus* is like Dr. Holland's fig., exactly, but short s. t. black dashes, not shown in that fig., are present as often as not. Sir George Hampson's description says of *Idahoensis:* "is dark reddish-brown, slightly irrorated with white," but mentions no s.t. black dashes. His fig. suggests my *Idahoensis* in colour, lacking the usual sharp s. t. dashes, but the discoidals seem darker centrally like my *furtivus*. He tells me "The type of *Idahoensis* is the gray form." His description of *furtivus* is "gray-brown or red-brown . . . . a series of small dentate black marks" (before s. t. line). His figure suggests my *furtivus*, but the discoidals are smaller than in any of my specimens of either species and the black s. t. dashes there shown are often wanting. He tells me "a specimen we have identified by Smith is the reddish form." As a matter of fact, in his descriptions, *Idahoensis* sounds the darker coloured species of the two, which, I take it, is incorrect. Prof. Smith says "both red and gray forms of each occur; *furtivus* has black sagittate spots before s. t. line; *Idahoensis* does not have these, though it may have a dusky shading." He also mentions a distinctive character in shape of orbicular, but this is so variable in both species that I find it valueless. Recently I sent him both species and he seemed misled, by the sagittate dashes, a supposed distinctive feature of *furtivus*, into taking my grayish form for his own species and telling me I had the names reversed, thus reversing his previous reference of my two forms. The species, for such I believe them to be, require placing on a firmer basis than they seem to have hitherto been.

271. *E. nordica*, Smith.—Described from two ♂ ♂ and two ♀ ♀ from Calgary and Olds, Alta. (B. C. in error). Olds is about 60 miles north of Calgary on the way to Edmonton. Its author states: "It is an ally of

*divergens*, and has the pale median vein; but the ordinary spots are not outlined in pale and are different in shape, opening on the pallid costa. This is also a much grayer species and the contrasts are more sharply marked. It has a little the appearance of *furtivus*, but the powdery markings and complete median lines easily distinguish it." The median vein is never as conspicuously pale as in most of my *divergens*, and it has not nearly so much resemblance to either this or *furtivus*, as the above remarks might lead one to suppose. Compare my notes under *pestula (supra)*. This is the commonest form of the group and is extremely variable in every particular. The most off-type specimen I have seen is briefly referred to under *servitus* (*q. v.*), July and August. Prof. Smith tells me that the type is from Cartwright, Man. I have a specimen from there which I believe to be *nordica*, but as the locality is not mentioned under the description, I think he must be mistaken, and that the type is a Calgary specimen. It is in the U. S. National Collection. I should never have recognized the species from Sir George Hampson's figure.

272. *E. divergens*, Walk.—Usually very common at treacle, and a pest at light. June and July. A ♀ in perfect condition on Sept. 8th, 1893, may possibly have been one of a second brood.

273. *E. redimicula*, Morr.—Common. July to middle Sept.

274. *E. servitus*, Smith.—The ♀ type (undated) is from Calgary, and was taken in 1895. It is figured in Ent. News, VI., Pl. xv. (December, 1895). I have never come across another specimen. The ♂ type, figured in Sir George Hampson's Catalogue, is from Colorado, and is in the U. S. National Museum at Washington, where the ♀ probably is also. I agree with Prof. Smith in thinking that this is really an aberration of *redimicula*. It looks like that species with the costal gray "smudged" from the base to the posterior end of the cell, obliterating the discoidal spots and the black in the cell except for a small black spot about its centre. I have a specimen of what I feel quite sure is *nordica* ♀ "smudged" in a similar manner, but without the black spot. This has been labelled *servitus* by Prof. Smith, which it most obviously is not. In addition to the smudge, this *nordica* gives the impression of all the colours having run together.

275. *E. tristicula*, Morr.—Common some seasons. June to middle Aug. Until quite recently Prof. Smith considered this to be *silens*, Grt., under which name it has for long been known in N. American collections. Shortly prior to the publication of his recent list he told me that the names referred to the same species, but he now finds that such is probably not

the case. Judging from the fig. of type in Sir George Hampson's Catalogue, I should say that the Calgary species is correctly named, but the ordinary markings are usually much more distinct. In October, 1903, I sent a pair of this species to Sir George Hampson as *silens*. He reported, "quite different from *silens*, Grt., of which we have the type; if it is not a form of *selenis*, Smith, it is a new species." He did not seem to associate it with *tristicula*, of which the type, from the Neumoegen collection, is in the Brooklyn Institute of Arts and Sciences.

276. *Arytus obscurus*, Smith.—Described from Calgary. The type, a ♂, is in the U.S. National Collection. Common at treacle some seasons, Aug. and Sept. Since the description was published, Prof. Smith has seen a series from here, and believes it to be a valid species, particularly as the genitalia differ from those of its ally. In the description he says: "This is undoubtedly distinct from *privatus*, all the maculation being lost in the very deep ground, though retaining the characteristics of the eastern form so far as they are traceable." Grote never saw it, but affirmed that there was nothing in the description to separate it from the older species. Of the latter, I have only a single ♂ from New York, which, besides being larger, is very much paler. One of my Calgary ♂ ♂, quite the palest I ever saw, comes very near this specimen, and may be distinct from the rest of the series, though I doubt it. Unless the separation is to be by the genitalia alone, I am at a loss to discover how *profundus*, Smith, is to be distinguished from *obscurus*. The two are described on the same page, and *profundus* (type, from Brandon, Man.) figured on the accompanying plate, which *obscurus* is not. The specimen seems scarcely paler than the average run of Calgary *obscurus*, and I have specimens of what I certainly call *obscurus* from Cartwright, Man., sixty miles southeast of Brandon. Sir George Hampson's figures of the two species do not solve the difficulty.

277. *Fishia Yosemitæ*, Grt.—A few at treacle most seasons, but by no means common. September. About the last non-hibernating noctuid to come to treacle, and sometimes to be found resting on board fences in the daytime. This species has until recently been confused with *Hadena relecina*, Morr., under which name I have sent specimens out. It is probable that all Northwest records of *relecina* really refer to this species. Prof. Smith corrects the error in Trans. Am. Ent. Soc. XXIX., p. 201 (June, 1903), and states that *Yosemitæ* was wrongly referred to *Aporophila*. He mentions that two of his specimens are from British Columbia, and then says that one of those two is from Rounthwaite. The latter place

is near Brandon, Man., and I think scarcely less than 650 miles from the nearest point of B.C.

278. *Ufeus plicatus*, Grt.—A single ♂ taken in a house near mouth of Fish Creek, Sept. 9th, 1893, has been so named by Prof. Smith, but he says it is redder than his specimens.

279. *U. satyricus*, Grt.—Rather rare end Sept. to April. I have never met with this species except in houses, to which I have no reason to suppose that it has been attracted by light, even in the fall or spring.

280. *Agrotiphila incognita*, Smith.—Described from two ♂ ♂ from Laggan, Alta. (B. C. in error), July 22nd, 1890, Aug. 10th, 1891, above timber, 7,000 ft. (T. E. Bean). A ♀ taken by Mr. Bruce, in Colorado, is in the British Museum. The type is at Washington.

281. *A. maculata*, Smith—Described from two ♂ ♂ from Laggan, July 22nd, 1890, above timber, 7,000 ft. (Bean). I took a ♂ and three ♀ ♀ there on July 19th and 20th, 1904. One ♀ near the summit of Mt. Fairview, on the east side of Lake Louise, above 8,000 ft., and the rest on St. Piran, above Lake Agnes over 7,500 ft., all on the wing in sunshine, though probably disturbed by me. They were easy of capture. The ♂ was in good condition, the ♀ ♀ freshly emerged. Both this and the preceding species are figured on plates accompanying the descriptions. This species can be easily recognized from the figure, except that the secondaries as there shown are very much too pale. This fact is mentioned in the text. My specimens vary a good deal in the intensity of the black suffusions. The type is at Washington.

[NOTE.—Dr. Dyar's list of "The Lepidoptera of the Kootenai district of British Columbia" (Proc. U. S. Nat. Mus., XXVII., pages 779-938) has just come to hand and will be occasionally referred to by me as the "Kootenai list."]

282. *Mamestra discalis*, Grt.—Common. End June to early Aug. Have bred it from larva beaten from Salix in early spring. The form is slightly smaller and more distinctly marked than specimens that I have from Colorado.

283. *M. mystica*, Smith.—Described from Winnipeg. Not common, though it showed up in rather unusual numbers in 1904. July. Treacle. I used to consider this a dark *discalis*, and though I certainly believe it to be a distinct species, I must say the extremes very nearly meet. In some respects it is perhaps nearer *nimbosa*, but as of that species I have only a single and rather rubbed ♀ from New York, I will not risk comparison. In the description Prof. Smith says: "It is somewhat intermediate between

*nimbosa* and *imbrifera*, but distinct from both by the dark ashen gray of the primaries, as against the pale shading in *nimbosa*, and the luteous shading in *imbrifera*." The secondaries in *discalis* are almost pure white, in *mystica* rather dark smoky, and in *imbrifera* still darker luteous smoky. The palest *discalis* and the darkest *mystica* sometimes require comparison with a series to satisfactorily place. *Mystica* is a slightly broader winged species, and seems to have rather more acute apices, but in many species I find wing form just as subject to variation as some other characters. The claviform spot is a little larger, but the most obvious difference that I can see besides that of colour, is that the entire maculation in this species is more distinct. This feature in combination with the darker colour seems to obviate the suggestion of a colour variety. The type is at Washington.

284. *M. imbrifera*, Grt.—One ♂ at head of Pine Creek in 1894, by Mr. Hudson. I have the species from Assiniboia and Manitoba. It seems easily distinguishable from *discalis* or *mystica*, as Prof. Smith points out, by the luteous, almost olivaceous coloration throughout. In my three specimens (all ♂ ♂) the blackish shadings before the s. t. line are much more suffused and produced towards the t. p. than in any of my *mystica*. In each of the three last species there seems to be sometimes a tendency in the orbicular and reniform to join.

285. *M. purpurissata*, Grt.—Common. July and Aug. The discoridal spots are sometimes confluent.

286. *M. juncimacula*, Smith.—One ♂ at light, Aug. 12th, 1901, which Prof. Smith says is smaller than his specimens. It is below the average size of my *purpurissata*, but exceeds the smallest. A brief comparison of these two species with each other and with *nugatis*, Smith, will be found in Ent. News for December, 1898, p. 241. The joining of the discoidal spots, on which the name is based, is not a constant feature. My specimens show the following difference from *purpurissata*: Wings narrower, costa of primaries straighter, apex less rounded, colour paler, with more distinct reddish shade. Basal, t. a. and t. p. lines more sharply angulated, and s. t. line more sharply toothed inwards above the **W;** secondaries paler. The sharper angulation of the lines gives the primaries a reticulated appearance not noticeable in *purpurissata*. These differences are all well marked in Dr. Holland's figures of the two species, by which they should be easily separated. As a matter of fact the secondaries in my *juncimacula* are more smoky

outwardly than in his figure, and are scarcely darker than in some of my *purpurissata*.

287. *M. columbia*, Smith.—Originally described as a *Tieniocampa*, but referred by its describer to this genus in Trans. Am. Ent. Soc., XXIX., 199 (June, 1903). The types are in the Museum of the Brooklyn Institute of Arts and Sciences and in U. S. National Museum, and were taken by Capt. Geddes in 1884 in "North-west British Columbia." The locality thus vaguely recorded may in this instance be intended for Alberta, N.-W. T., where Capt. Geddes seems to have done a good deal of collecting, and where the species is rather common at treacle, and sometimes on flowers in the daytime, during July and August. Some years ago Prof. Smith named the species for me as *meditata*, under which name I suspect that it still stands in many collections, and of which it is, I suppose, the Western representative. I have compared a good series of both sexes from Calgary with 2 ♂ ♂ and a ♀ from Cartwright, Man., and with a series of *meditata* from Chicago and the extreme North-eastern States. The U. S. specimens run much darker in colour than our Western form, being dark reddish-brown, sprinkled with gray scales, *columbia*, as a rule, varying from a pale rusty yellow to an almost pinkish red. The three Manitoba specimens, however, which come from Cartwright, from Mr. Heath, though certainly *columbia*, rather than *meditata*, seem to suggest an intergrade.

288. *M. cervina*, Smith.—Described from Winnipeg, Man. The type is at Washington. Formerly confused with *lustralis*, under which name I used to send it out. The description states, "It is a narrower winged species, coming nearer to *meditata* in this respect and with less well pectinated antennæ. The markings, while much the same in all essential points, are less distinct." There also seems to be a difference in the genitalia. I have only one ♂ *lustralis*, coming from Dr. Barnes, locality not stated. Besides being paler, it differs in the points mentioned, except that I can see no antennal difference, even with a lens. Not rare. End June and July. Dr. Holland's figure of *lustralis* is *legitima*, Grt.

289. *M. segregata*, Smith.—Described from Laggan (B. C. in error). Taken at light, May 13th and 17th (T. E. Bean). Figured with the description.

290. *M. gussata*, Smith — } Not rare at Sallow blossoms near mouth
291. *M. negussa*, Smith.— } of Fish Creek, Bow River, at end of April and early May. Both described from Calgary. Both are figured with the description, and a good figure of *negussa* is shown in Dr. Holland's

"Moth Book." The types of all the last three mentioned forms are at Washington. Whether they really represent three species is an open question. I can see nothing in the figure of *segregata* to separate it from Calgary *gussata*, and Sir George Hampson, who has both, as well as *negussa*, in the British Museum, or at any rate has seen the Laggan form and has the two others, considers *segregata* and *gussata* to be the same species. Not having seen the Laggan form personally, further comment upon it would be out of place. *Negussa*, which was described at my instigation, is practically *gussata* without the black or blackish markings present in that species as a basal streak, in the cell, before the s. t. line, and as a dash connecting t. a. and t. p. lines below the discoidal spots. The forms which when collecting them, I used to look upon as probably distinct, used to be not uncommon in the early spring in the above mentioned locality, but having changed my place of abode to ten miles further west, where I have never met with either, I have been unable to make special trips for them at the right season, and have not sufficient material to enable me to form anything like a decisive opinion. I have left 2 ♂ ♂ and 1 ♀ *gussata*, indifferent specimens, and 3 ♂ ♂ and 2 ♀ ♀ *negussa*, in almost perfect condition. *Negussa* looks to me a slightly broader winged species (?), in which the black is sometimes represented by dark chocolate brown, but seems very variable, and in some there is no trace of any dark markings whatever except in the reniform. I have a suspicion that a long series would show that the dark brown markings, when present, had a tendency to darken into black, which might make a separation of the forms very difficult. Prof. Smith's examination of the genitalia shows nothing against the suggestion. Dr. Dyar in his Kootenai list records *segregata* from Kaslo, B. C., and suggests that *gussata* is a variety of it.

292. *M. neoterica*, Smith.—Described from Winnipeg. Common, end June and early July. One specimen, in fine condition, on Aug. 4, 1893. The western representative of *detracta*. Prof. Smith says (Journ. N. Y. Ent. Soc., XI., No. 1, p. 16, March, 1903) "*neoterica* looks like a small *detracta* with some minor differences in type of maculation. When the genitalia of the ♂ ♂ are compared these differences are enormously increased, though there is no change in type." I have *detracta* from Louisiana, Mo.; Chicago; and New Brighton, Pa. In the Kootenai list, Dr. Dyar seems to imply that the western prairie *neoterica* is darker than eastern *detracta*. In my two series, though the colour difference is not strongly marked, the reverse is the case. *Detracta* is a little larger and has somewhat of a smoky suffusion throughout. *Neoterica* has a much

smoother appearance and shows more of a pale fawn ground colour, which seems generally obscured by the suffusion in *detracta*. I have only two ♀ ♀ of *neoterica*, all that seem to have been taken here in twelve seasons. These are both narrower in expanse than the average of the ♂ ♂. In *detracta* my ♀ ♀ average larger than the ♂ ♂. A glance at Dr. Holland's figures will give a good idea of the usual differences between the two forms. The type is at Washington.

293. *M. Farnhami*, Grt.—Not rare, at light and treacle. End May to early July.

294. *M. liquida*, Grt.—Common. End May to early July.

295. *M. Atlantica*, Grt.—Rare on the whole. June and July. Treacle. Not observed previous to 1896, and not met with every year since.

296. *M. radix*, Walk.—Common at treacle. June.

297. *M. Nevadæ*, Grt.—Rare. Treacle. June and July. In his Kootenai list Dr. Dyar says that a form occurring near Kaslo, B. C., is the same as the Calgary species, and suggests *Nevadæ* as the correct name, with *Canadensis*, Smith, as a probable synonym.

298. *M. invalida*, Smith.—Very rare. Four specimens only, all ♀ ♀. May 31st, 1902, June 18th and 19th, 1903. Method of capture not stated on labels, but probably light. Prof. Smith has one of the specimens. This, of course, differs from a *Hadena* in having hairy eyes, otherwise it has a strong superficial resemblance to certain gray forms of *Xylophasia versuta*, and might easily be mistaken for that species. It may best be distinguished from it by the presence of whitish or grayish white patches at base, in orbicular and claviform, and in s. t. space, especially near apex and anal angle. The secondaries are duller smoky, without any of the mother-of-pearl sheen which seems characteristic of *versuta*.

299. *M. trifolii*, Rott.—Common, end June to Aug., but absent in some seasons.

Var. *Oregonica*, Grt.—One specimen, a ♂, dated July 27th, 1898, is sharply distinct from the rest of my series. I had it for some years with *Scotogramma phoca*, to which I cannot help claiming that it bears more resemblance, but where I admit its presence never satisfied me. Dr. Barnes when viewing my collection in August, 1902., picked it out as this var. of *trifolii*. It is of the average expanse of *trifolii*, but actual measurement proves that my eye was correct in judging it to be broader in wing than any of that species I have examined. In colour it is dull luteous smoky throughout, and the maculation is very indistinct. The

median and t. p. lines seem more sharply lunulate inwards and toothed outwards than in *trifolii*, the s. t. line and terminal shade are hardly discernible, and the secondaries lack the pearly sheen of that species. By the hairy eyes it is certainly Mamestra rather than Scotogramma, but it was its dark luteous tint and smoky suffused maculation which made me place it tentatively with *phoca*. Prof. Smith has recently seen the specimen and, calling it *trifolii*, adds, "I can't say anything else, unless you prefer to label it *Oregonica*. In my series the primaries become almost black." It stands waiting for something like a connecting link. Dr. Dyar in recording a specimen of *Oregonica* in Mr. Cockle's collection at Kaslo, adds, "I am inclined to regard this form as distinct from *trifolii*" (Kootenai list).

300. *M. obesula*, Smith.—(Can. Ent., XXXVI, 151, June, 1904). Described from a ♂ and three ♀ ♀: one from Denver, Colo., the rest from here. The type is in Prof. Smith's collection at Rutgers College. Two pair, one a ♀ co-type, are in my own. Six specimens altogether have been taken, all at light, July 20th to Aug. 5th, 1903. The description says, "It is in a way intermediate between *Farnhami* and *trifolii*, having the colour contrasts of the former, with the build and maculation of the latter." I endorse those remarks, though before the description was published I had not noticed its resemblance to *Farnhami*, and had placed it next *trifolii*, than which, as its name implies, it is a stouter, heavier built insect, broader winged, and with less acute apices. It seems to be a well-marked species.

301. *M. rosea*, Harr.—Common. End May to early July.

302. *M. rubefacta*, Morr.—Very rare. Four or five specimens only. Middle June and early July.

303. *M. picta*, Harris.—A single specimen, ♂, on Aug. 16th, 1903, by Mr. Hudson. It is slightly smaller, but otherwise not separable from Chicago examples.

304. *M. assimilis*, Morr.—Not met with previous to 1896, when a few were taken. Since 1901 it has been rather common. End June and July.

305. *M. ingravis*, Smith.—Described from Calgary, and figured with the description. Fairly common at treacle and light, May and June. From what Prof. Smith says, this seems to have no very near allies in the genus. Some specimens show a decided tendency to melanism. The type is at Washington.

306. *M. adjuncta*, Bdv.—One specimen at treacle, June 28th, 1895 It has lost an abdomen, three wings and one antenna, during a journey through the mails.

307. *M. circumvadis*, Smith.—The type is a ♀, taken here at light on July 21st, 1900, and is in Prof. Smith's collection at Rutgers College. A ♂ on July 26th, 1902, is not quite such a fine specimen, and has lost both antennæ in a journey through the mails. Three or four specimens were taken at light during 1904, June 30th to July 13th. The species is recorded from Aweme, Man. (June 27th), by Mr. Norman Criddle. Prof. Smith says it is allied to *chartaria* and *defessa*. Sir George Hampson has seen a ♂ and says it is allied to *capsularis*, *minorata* and *ectrapela*.

308. *M. Tacoma*, Strk.—Fairly common some years. June to middle July. The species was described from Pullman, Wash., and Dr. Strecker adds, "Superficially having some resemblance to *lilacina* and *rugosa*, but agreeing in detail with neither." *Dodii* in the West was then standing in some collections as *rugosa* and may have been intended in Strecker's remarks. It is certainly more like *Tacoma* than is either Calgary *lilacina* or Ottawa *rugosa*, but I had *Tacoma* standing in a different series from *Dodii* five or six years before it had recognition as a species elsewhere. It averages larger than *Dodii*, and has the ground colour of a clearer lilac-gray, especially in the s. t. area. A nearly constant distinctive feature is that in *Dodii*, a reddish shade runs through s. t. space from the costa near the apex, obliquely towards where the t. p. line meets the inner margin. This is darkest above the subcostal vein and gradually fades out below it, generally vanishing completely ere it quite reaches the inner margin. It is not always present at all below subcostal vein, but there is very rarely any trace of it below the same point in *Tacoma*. In *Dodii* the orbicular varies tremendously in size, shape and colour. I have one specimen in which it is quite round, almost pure white, and hardly more than ¼ the size of the reniform. In others it is elliptical, irregular and ⅔ to ¾ the size. The orbicular in *Tacoma* varies much less, is more regular in outline, very slightly oval, more even in colour, and as clear or clearer than the palest part of s. t. area. As a whole the two species are sharply distinct, but occasional specimens require familiarity with the range of variation to determine.

(To be continued.)

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