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OBSERVATIONS UPON *SPILOSOMA CONGRUA*, WALKER.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

On the 29th of June, 1897, I found, in the Gomin Swamp, two *Spilosomas*, females, lying side by side. One of them was much spotted, and presented the exact appearance of the insect which is figured, with closed wings, in the original edition of Dru Drury's work, and named by him *Bombyx cunea*. The other was white, but on the median nerve, at the angle of the second fork, there was a small black dot, hardly perceptible. The thorax was clothed with light down; the abdomen was white and spotless. The eyes were black, as were also the under sides of the antennæ and feet. The front of the thorax under the head was luteous.

This second moth laid eggs on the 10th of July, and the eggs produced larvæ which, in due time, pupated. The moths appeared in the following spring.

I took the mother moth to the meeting of the Entomological Society of Ontario, at London, and readily identified it with specimens marked "*Spilosoma congrua*, Walker," in the Society's collections.

Of the imagoes raised from this insect some were allowed to escape, some I gave away, and a few were crippled; but I have twenty-eight of them before me at this moment, and they present a most interesting subject for study. I will group them:—

I. AS REGARDS THE WINGS:

- (a) Two males, all but immaculate, having the faintest indication of a dot at the second fork of the median nerve.
- (b) One male having a decided black spot at the point above mentioned.
- (c) Five males and seven females having the spot and indications of an irregular transverse row of dots near the hind margin.
- (d) Seven females with the spot and a well-defined row of black dots near the hind margin.
- (e) One male and two females with the spot, and a terminal row and sub-terminal row of dots.

- (f) Three males and one female with four rows of dots on the primaries, and a spot near the costa of the secondaries.

II. AS REGARDS THE ABDOMEN :

Eleven specimens are immaculate, and seventeen have longitudinal rows of spots.

- (a) and (b) have the abdomen immaculate.
 (c) Two specimens have two distinct rows of black spots *on the under side*, and no more ; two have dorsal and side rows of spots, but none underneath. The rest have immaculate abdomens.
 (d) One has five rows of spots, and six have the two rows on the under side only ; but of the latter one specimen has two black dots on the back.
 (e) One (male) is immaculate as regards the abdomen ; one female has the five rows ; and the other has rows on the under side only.
 (f) One (♀) has all five rows ; one (♂) has only the rows on the under side ; and one (♂) has an immaculate abdomen.

Of the males the usual expanse of the wings is 17 lines, but one reaches 20. Of the females the usual expanse is 20 lines.

I sent two of the moths to Washington, and Dr. Dyar kindly wrote me word that the insects belong to the species *Antigone* of Strecker. Mr. Lyman also submitted a pair of the same brood to Mr. Beutenmüller, who said that he had seen Strecker's types at Reading, Pa., a few days before, and that the species was certainly *Antigone*. Very well.

In Smith's list the *S. congrua* of Grote is given as a synonym of *S. antigone* of Strecker. What does Grote say on the subject? "On my first visit to the British Museum I examined Walker's types, and made the following descriptions of his specimens"

Here follows a description that exactly fits my group (c). And he adds, "I was doubtful about its being North American. But very likely it is a form that Mr. Strecker calls *Antigone*, which must join that author's long list of synonyms." (CAN. ENT., Vol. XV., p. 9.)

But Walker gives his own account of *S. congrua* ; and, as the British Museum lists are not easily obtainable, and but few of our Canadian entomologists have copies of them, I ask room for the description in full,

"SPILOSOMA CONGRUA.

"Alba; palpi supra nigri; pedes antici nigro luteoque varii. Mas.—caput et thorax anticus subtestacea; alæ anticæ e guttis fuscis quadrisubfasciatæ.

"White. Tarsi with black bands. Fore coxæ and fore femora luteous, with black spots on the inner side; fore tibiæ striped with black on the inner side. *Male*.—Head and fore part of the thorax with a slight testaceous tinge. Fore wings with four oblique very imperfect and irregular bands, composed of pale brown dots. Length of the body 6-7 lines; of the wings 16-20 lines. a-c Georgia. From Mr. Milne's collection."

(*List of the specimens of Lepidopterous Insects in the collections of the British Museum. Part III. Lepidoptera Heterocera*, p. 669. Published 1855.)

With this description the insects in my group (f) agree. One has even the slightly testaceous thorax, which is not common; and another has the black spots on the inner side of the luteous femora. All have the four bands.

With my specimens before me I can entertain no doubt that Walker and Grote were describing forms of one and the same species. I state this after much consideration, for Smith says, in his "Preliminary Catalogue of the Arctiidae (CAN. ENT., Vol. XXII., 16), "Walker's description does not apply to *Antigone* at all, while it does apply to *cunea*, a specimen of which, according to Butler, was of the *types*."

What is meant by *cunea*?

There is a moth well known all over North America. It was described and named by Harris (Insects Injurious to Vegetation, pp. 357-9), and much valuable information respecting it has been given by Dr. Bethune (CAN. ENT., Vol. V., p. 141), Professor Saunders (Insects Injurious to Fruits, p. 171), and others. It is the Fall Web-worm Moth, the *Hyphantria textor* of Harris.

Of this *H. textor* we have in Canada but one brood in a season. Its eggs hatch "from July 10th to the middle of August" (John G. Jack, CAN. ENT., XVIII., 23). The larvæ are full-grown by the end of September. The moths have generally, in Canada, spotless wings and spotless abdomens, according to the descriptions given by Harris, Bethune, Saunders, and others, and their usual expanse of wings is 14 lines.

But southward there is a second brood of *textor* which is noted for its variations. The most spotted of these, the extreme variety, is supposed to have been the *Bombyx cunea*, figured by Drury in 1770. And therefore it is said the name of the variety must take the place of the specific name given by Harris, and till very lately generally accepted.

Both Professor Riley and Professor Smith have well and clearly expressed the contention as it now stands. The former says :

"The moths vary greatly, both in size and coloration. They have, in consequence of such variation, received many names, such as *cunea*, Drury; *textor*, Harris; *punctata*, Fitch; *punctatissima*, Smith. But there is no doubt, as proven from frequent breeding of specimens, that all of these names apply to the very same insect, or at most to slight varieties, and that Drury's name, *cunea*, having priority, must be used for the species." (Riley quoted in Packard's *Forest Insects*, pp. 246-7.)

The latter says :

"In Mr. Grote's list of 1882, *textor* and *punctata* stand without number, but in Roman letters, and therefore not as synonyms. There is no doubt at all of the identity of all these forms. Prof. Riley has proved that to demonstration, if proof were required to the statements of earlier writers." (CAN. ENT., XXII., p. 165-6.) And in his *List of Lepidoptera of Boreal America* he gives :

HYPHANTRIA, Harr.

1096. *Cunea*, Drury.

punctatissima, S. & A.

punctata, Fitch.

congrua, Walker.

textor, Harris.

candida, Walker.

ab. pallida, Pack.

But is there really no room for doubt? Is the proof so entirely satisfactory? It might have been were there but one variable insect in the field to meet the requirements, but with two or more the matter is fairly open to question.

Let us consider the illustrations that accompany Prof. Riley's statement. I have them by me in that valuable work, Packard's *Forest Insects*, p. 245-6. First compare with the illustration of the Fall Webworm Moth on page 245, the illustrations accompanying Dr. Bethune's and Prof. Saunders's articles above referred to — the disproportion in

contour and size at once strikes the eye. Riley's cut represents an insect 20 lines in expanse of wings. I venture to say that no Fall Web-worm Moth ever attained such a size. But latitude was necessary to take in such moths as *congrua* and *cunea*. Then as regards the series of wings given on page 246. These we may conclude, from the whole tenor of the article, include representations of *cunea*, *punctata*, *punctatissima*, etc. They are on the scale of 18 lines for expanse of wings. *There is not one of them but can be exactly matched from insects I raised, or that were taken with the mother insect in the Gomin.*

Let us now consider the larvæ :

A comparison of the Rev. Dr. Hulst's account of the larvæ of *S. congrua* (Ent. Amer., II., 162), and of Professor Saunders's description of the larva of *S. cunea*, in its last stage, with the following life-history, written with care by myself, will, I think, show that the three descriptions relate to one and the same species.

Life-history of *Spilosoma congrua*, Walker :

Eggs.—Waxen, globular, laid dispersedly and unattached on the 10th of July, very small for the size of the insect—one-thirtieth of an inch in diameter. Hatched July 16th.

Newly-hatched larva.—One-tenth of an inch long, of a pale greenish tint, with a row of reddish-brown tubercles along the middle of each segment above. Every tubercle has two or three rather long, black hairs. Head dark brown. The larva feeds with avidity upon *Chenopodium album*, also upon *Taraxacum* and *Plantago*. It shows no disposition to spin. Moulded July 23rd.

Larva after first moult.—Length, three-tenths of an inch. Body reddish-brown, with black warts, from which proceed spreading tufts of long, black hairs with short spinous branches. Head bilobed, black. Feet black. Moulded July 29th.

Larva after second moult.—Length, half an inch. Body dark brown, with dark brown warts thickly set with tufts of black hair. A side line of red warts with a black tuft above and another below each wart. Larva exceedingly active—scuffles about in true Arctian fashion. Moulded August 8th.

Larva after third moult.—Length, one inch and one-tenth. Head shining black, bilobed. Body black, warty, densely clothed with jet black hairs. A side line of red warts as before, but hardly seen under the pile that overlaps it.

Mature larva.—One inch and three-quarters long. Body colour dark madder-brown, dotted with gray, and almost hidden by jet black bristly tufts which spring from jet black warts—these warts are arranged transversely in the middle of each segment. Along the sides is a row, closely two-fold, of chestnut-coloured patches. Head and fore legs glossy black.

Note.—Every larva of the batch was true to this description.

On August 19th, the larva formed a slight web, with hairs from its body intermingled with the meshes. The web was placed between leaves at the bottom of the breeding-cage.

Chrysalis.—First waxen in colour, then chestnut, and then very dark brown; plump, seven-tenths of an inch long, three-tenths in diameter, and terminating in two clusters of spines—5 in each cluster. These spines taper regularly and are terminated with small disks.

To allow the moth to escape the breast portion of the chrysalis-case shells off in the form of an apple-pip.

The indications are that the much-spotted *Spilosomas* (one of which I mentioned at the beginning of my paper, and five of which were taken, in the neighbourhood of Quebec, in the season of 1897) hold the same relationship to *S. congrua* as the much-spotted *textors* do to their type. They answer exactly to the description of *S. cunea* given by Walker in the B. M. list above mentioned. We cannot, however, be absolutely sure on this point till we have bred moths from one of them.

OBITUARY.

By the demise of DOMINIQUE NAPOLEON ST. CYR, Esq., which occurred in Quebec on the 3rd March instant, from congestion of the lungs, at the age of 74 years, natural science has lost a worthy student and education a hearty promoter. He was born at Nicolet, P. Que., and educated at the college there. In 1867 he was admitted a notary public. Previous thereto he had been a model school and academy teacher. He was returned, in the Conservative interest, to the Legislative Assembly, Que., as member for the county of Champlain, at the general elections in 1875 and again in 1878. Going out of politics, he took up his residence in Quebec, and was appointed Curator to the Provincial Government's museum in the Parliament Buildings. Under his practical care and thorough knowledge of science, what appeared to be a heterogeneous conglomeration of specimens of all sorts, assumed shape as a very nicely classified museum. In it is preserved the valuable entomological collection of Abbé Provencher, which is, of itself, well worth a visit to students. As an entomologist and botanist Mr. St. Cyr will be much missed. His successor as Curator of the Provincial Government museum is Leonidas Larue, Esq., an M. D. of Laval University. J. EVELEIGH TREFFRY.

THREE NEW COCCIDÆ.

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

Nidularia (?) *californica*, n. sp.

♀ covered with wax resting on a thin white secretion. Colour orange-ferruginous, shiny, varying greatly in size and shape. The average specimens are about 3 mm. long, $1\frac{1}{2}$ wide, and 1 mm. high: generally pyriform, but it is difficult to give any special form, as the insect adapts itself to the position on the plant.

After boiling in K. H. O. derm is colourless, mouth-parts, glands and caudal portion remaining brown. There are indications of antennæ, which are very small and very bristly, segmentation not visible. There are four large disklike spiracles on the ventral surface, each disk contains numerous glands. There is a row of thick, blunt spines on each margin, and one on the dorsum. These marginal spines are shaped like a spear-head set in a socket. With these there are several rows of round spinnerets. Rostrum attached to a prominence, which, however, varies with the position the insect adopts.

End of abdomen strongly chitinized, with the margin strongly crenate and plicate, and deeply cleft in the middle as in *Lecanium*. Numerous round glands scattered near its margin, and several strong spines on margin at intervals. Anal ring with numerous (eight?) stout hairs. On the ventral surface opposite the anal ring there is a round projection with four stout spines. This is inserted in the cleft of the anal lobes.

Hab.—On the roots of Bunch grass, Mountain View, Cal.

Prof. Cockerell has examined specimens, and says that this strange coccid will probably form a new genus.

Dactylopius eriogoni, n. sp.

♀ enclosed in a densely woven white felt sac about $2\frac{1}{2}$ mm. long and 1 mm. broad; also secreting considerable loose cottony matter.

♀ colour light yellow, slightly covered with white powder, about 2 mm. long and 1 mm. broad. Last segment of body with two short white filaments. Legs and antennæ light brown. Young larvæ and eggs light yellow. When boiled in K. H. O. turns brown. Numerous very fine slender spines on dorsum. Antennæ 7 jointed, quite bristly. Sequence of the joints of the antennæ is quite variable. Joint 7 longest, then comes 3, then 1 and 2, but these are sometimes longer than 3. Joint 4 is next, but sometimes joint 6 is longer. Joint 5 is generally shortest. Formula approximately, 7312465.

Legs small and rather slender. Femur, tibia, and tarsus all bearing rather large stout bristles; femur twice as long as tarsus; claw slender. Tarsal digitules long, slender, slightly knobbed. Digitules of claw slightly longer than claw, slender, knobbed.

Anal lobes not conspicuous, bearing a long, rather stout seta, several stout conical spines, hairs and spinnerets. Anal ring medium, with the usual six hairs.

Hab.—On roots of *Eriogonum*, sp. Stevens Creek Canon, near Mountain View, Cal.

Kermes Austini, n. sp.

♀ scale spherical, about 4.5 mm. broad, 4 mm. long, 4 mm. high. (Amongst the material are a number of parasitized specimens, which are much smaller in size.) Dorsum slightly covered with a waxy secretion. Scale not gibbous and segmentation indistinct, indicated by brown dots when seen through a lens. Colour light brown, with several irregular white stripes running parallel with the segments. There is a distinct groove on the caudal portion of the scale, which is distinctly marked with brown. Scale more or less pitted. Pits generally marked dark brown or black. Ventral scale is more or less flat and light brown. Keel not very prominent. When boiled in K. H. O. derm is light brown, with several brown spots and numerous round glands—orifices, which are larger near the margin. A few short spines near the margin. Antennæ very short and stout, indistinctly 6-jointed. Joint 3 longest, 4 and 5 subequal.

Larva (taken from body of ♀).—Colour pink, twice as long as broad. After boiling in potash, colourless. Antennæ and legs yellow. Antennæ 6-jointed. Joint 3 longest, then comes 6 with numerous stout bristles and rounded at tip. Joints 2 and 5 subequal. Joints 1 and 4 about equal. Formula: 36(25)(41). Caudal tubercles large, with very long setæ and three stout spines—one at base of tubercle, one on its inner margin, and one near setæ. On the margin of body each segment has a stout spine. Legs stout. Tarsus not twice as long as tibia. Femur nearly as long as tarsus + tibia. Claw slender and curved.

Hab.—On twigs of *Quercus oblongifolius*, Guejito Mountains, eight miles east of Escondido, San Diego Co., Cal. (F. Austin, coll.)

This species is allied to *Kermes galliformis*, but smaller, with the darker parts of a decided fulvous colour. Prof. Cockerell has examined specimens, and agrees that it appears to be a valid species.

Lecaniodiaspis rufescens, Ckll.

This species was sent to me from Los Angeles, Cal. Found on a new food plant, *Adenostoma fasciculatum*.

FOUR NEW DIASPINE COCCIDÆ.

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

Aspidiotus cueroensis, n. sp. — ♀. Scale diam. slightly over 1 millim., circular, slightly convex above and beneath, with the margin somewhat elevated, like an oyster; very pale gray or grayish-white, quite a delicate shade, exuviae more or less to one side, covered, inconspicuous, but appearing as a dark spot on the inside of the scale. ♀. Shape ordinary; black when dry. No circumgenital glands. Anal orifice elongate oval, moderately large, distant from bases of lobes about $1\frac{1}{2}$ times its length. Only one pair of lobes, these and the area about their base remaining dark brown after boiling; lobes rather large, but short and broad, contiguous at the base, but thence diverging to their rounded apices, whence they slope downwards to the comparatively short outer side, the shape of the lobes being almost as in *A. ostracaformis*. The second and third lobes, somewhat as in *A. coniferarum*, are represented by rounded prominences, which can hardly be said to project above the margin. Some distance below the place of the second lobe is a small round hyaline gland-spot, quite conspicuous; another, less conspicuous, is adjacent to the base of the rudimentary third lobe. Pyriform processes of the interlobular incisions short and inconspicuous; at the first incision the inner process is considerably larger than the outer. No plates, but the usual spines are present, a pair some distance beyond the place of the third lobe being quite large. Margin beyond the lobed area, and even within it, minutely crenulate. Dorsal glands extremely few, circular. In the area which in other species is occupied by the lateral groups of circumgenital glands, are longitudinal brown stripes, very conspicuous, apparently due to chitinous thickening. A less conspicuous transverse stripe occurs in the place ordinarily occupied by the median group of glands.

Hab.—On rough bark of trunks of *Celtis*, Cuero, Texas, June 1, 1898. (C. H. T. Townsend.) One specimen was badly infested by a fungus. Allied to *A. coniferarum*, Ckll.

Aspidiotus duplex, Ckll., var. *paenice*, n. var. — ♀. Has only two groups of circumgenital glands (the anterior and posterior lateral groups being united), each of 70 to 76 orifices. First three pairs of lobes conspicuously notched on each side; fourth lobe with one deep notch. At most only two or three minute squames beyond the fourth lobe. About 15 glands in the groups laterad of the mouth.

Hab.—On bark of peony from Japan, quarantined by Mr. Craw, at San Francisco. The peony bark, boiled in caustic soda, gives a very fine crimson or madder colour. Also on *Camellia japonica*, in California. (Dept. Agric., Div. Ent., 376^k.) The scales on *Camellia* were lighter than usual.

Diaspis celtidis, n. sp.—♀. Scale dark gray, exactly like the bark on which it rests, fairly convex, first skin visible, brown or ferruginous, placed near the margin. Greatest diameter of scale about 1 millim.

♀. No circumgenital glands, even in a female full of young. Two pairs of brown lobes; median lobes rather large, upright, separated by a fair interval, in which is a pointed squame extending very slightly beyond their tips; second lobes separated from the median by a similar interval; median lobes rounded at the end, deeply and squarely notched on the outer side; second lobes bluntly pointed, deeply notched on the outer side, the portion beyond the notch forming a pointed lobule, the whole lobe resembling somewhat a lower molar tooth of *Sorex*. Beneath each lobe is a pair of small pyriform brown glands; some distance beyond the second lobe is another pair of these glands, forming a brown patch, but without any lobe, and supporting a rather large spine. Dorsal glands few in number. Anal orifice small, a good distance from hind end.

♂. Scale of the usual *Diaspis* form, but short and broad, hardly more than twice as long as wide, dull gray, not in the least carinate; exuvia placed longitudinally at one end, large, not far from half the length of the scale, thick, dark brown, with small transverse ridges, and a light brown margin and central longitudinal ridge. Sometimes the whole exuvia is light brown.

Hab.—On *Celtis*, San Antonio, Texas, June 23, 1898. (*C. H. T. Townsend*.) Somewhat allied to *D. baccharidis*, but differs by the formation of the lobes and the absence of circumgenital glands. On the *Celtis*, at San Antonio, Prof. Townsend found also a variety of *Pulvinaria innumerabilis* (Rathv.).

Diaspis auranticolor, n. sp.—♀. Scale circular or suboval, diam. not much over 1 millim., only slightly convex, white, but covered with a gray film of the epidermis of the plant. Exuviae lateral, bright lemon-yellow, first skin exposed. Removed from the bark, the scales leave a white mark.

♀. Bright orange; light yellowish after loss of contents, the orange colour being contained in oil-like globules, not altered by caustic alkali.

Five groups of circumgenital glands, median of 9, anterior laterals 26, posterior laterals 16 to 19; two rows of dorsal transverse glands on pygidial area. Anal orifice level with hind part of anterior lateral groups of glands. Lobes not at all brown; median lobes large, pyramidal, blunt at end, their bases meeting but their tips far apart, the outer side crenate with two small notches, a small spine at each inner base. Second lobes represented by three rounded but rather elongate lobules, of which the middle one is considerably the largest; third lobes represented by two pointed processes, the second of which may be bifid at its end; fourth and fifth lobes represented by three or four pointed processes, like the teeth of a saw. Squames quite long, spinelike, with simple ends; one between the first and second lobes, two between the second and third, three between the third and rudimentary fourth, six between the rudimentary fourth and fifth, and about five large ones beyond the fifth.

♂. Scale of the usual form, white, without any keel; exuvia light yellow. Newly-hatched larvæ (alive) pale pink, without marks. (The larva of *D. amygdali* is pale yellowish.)

Hab.—On *Osmanthus illicifolia* (this is presumably a garden name for *O. aquifolium*, Siebold) from Japan, quarantined Feb. 3, 1899, by Mr. A. Craw, at San Francisco. Related to *D. amygdali*, but quite distinct.

A FEW CANADIAN LONGICORNS.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

Having prepared for the Ottawa Naturalist a list of the Cerambycidae occurring in this district, I find, among other Canadian material in my cabinets, the following species which appear worthy of record: For the Vancouver Island species I am chiefly indebted to my friend, Rev. G. W. Taylor, who resided near Victoria when the specimens were collected. Other material was collected by Mr. A. J. Hill, of New Westminster, B. C., and by Dr. Fletcher. Several of the species I captured when at New Westminster, etc., in 1888, and a few were received from Mr. T. C. Weston, of the Geological Survey, and from the late Capt. G. Geddes.

Ergates spiculatus, Lec. Two fine specimens from V. I.

Prionus californicus, Mots. Apparently common in V. I.

Tragosoma Harrisii, Lec. Cypress Hills, M.

Asemum atrum, Esch. Common, B. C. and V. I.

- Nothorhina aspera*, Lec. Several from V. I.
Criocephalus productus, Lec. B. C. (Mr. A. J. Hill, New Westminster.)
Criocephalus agrestis, Kirby. Stupart's Bay.
Criocephalus asperatus, Lec. Cypress Hills and B. C.
Phymatodes variabilis, Fab. Common, V. I.
Phymatodes nitidus, Lec. V. I. (Victoria.)
Phymatodes decussatus, Lec. Common, V. I., B. C.
Rosalia funebris, Mots. B. C. (New Westminster, Riverside, etc.)
Clytus planifrons, Lec. V. I. (One specimen.)
Neoclytus conjunctus, Lec. V. I. (Two specimens.)
Leptalia macilentia, Mann. B. C.
Toxotus vestitus, Hald. Very common in B. C. and V. I. The form with red legs and antennæ not rare.
Toxotus virgatus, Lec. Crane Lake, N.-W. T. (Prof. Macoun.)
Pachyta monticola, Rand. B. C. Very variable in colour.
Pachyta liturata, Kirby. Fort McLeod, Alta., and B. C.
Pachyta spurca, Lec. V. I. Very fine specimens.
Achmæops longicornis, Kirby. Fort McLeod. (Geddes.)
Leptura obliterated, Hald. V. I.
Leptura subargenta, Kirby. B. C. Very common.
Leptura læta, Lec. V. I. A fine species.
Leptura Canadensis, Fab. B. C.
 var. *erythroptera*, Kirby. B. C.
 var. *cribripennis*, Lec. B. C.
Leptura vagans, Oliv. Muskoka, O.
Leptura letifica, Lec. B. C. and V. I. Very common.
Leptura chrysocoma, Kirby. B. C. and V. I.
Leptura proxima, Say. B. C.
Leptura crassicornis, Lec. V. I.
Leptura scripta, Lec. B. C. and V. I. Very common.
Plectrura spinicauda, Mann. V. I. (Fletcher.)
Monohammus maculosus, Hald. Rat Portage, O. (Fletcher.)
Monohammus confusor, Kirby. Sydney, N. S., to Westminster, B. C.
Monohammus marmorator, Kirby. Cypress Hill. (Weston.)
Synaphæta Guexi, Lec. V. I. (Taylor.)
Acanthocinus spectabilis, Lec. B. C. (Hill.)
Oberea quadricallosa, Lec. B. C.
Tetraopes femoratus, Lec. B. C. Common.

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—I.

BY GEO. B. KING, LAWRENCE, MASS.

The published records of the occurrence of coccids in Massachusetts are so scattered and the number found to exist is so large, that it seems quite desirable that they should be brought together and published in one entomological journal. So far as I can learn from careful search of the literature up to January, 1896, there had been only 13 species recorded. Since then the list has increased to 74. A list of the 13 species is: *Aspidiotus perniciosus*, *Mytilaspis pomorum*, *Chionopsis furfurus*, *C. spartinæ*, *Aulacaspis bromeliæ*, *Dactylopius adonidum*, *Phenacoccus aceris*, *Gossyparia ulmi*, *Orthezia insignis*, *Pulvinaria innumerabilis*, *Lecanium hesperidum*, *L. platycerii*, and *L. filicum*. A check-list reference-list of the literature of Massachusetts Coccidæ will be published in a supplementary article. Distribution, food plants, parasites, and predaceous enemies (known to me to occur in Massachusetts on coccids) will be given; also, the distribution of the Massachusetts coccids found in other States. This will show to some extent what little is generally known of these most destructive insects in this country. The only States that know, or have any material knowledge of, the number of these pests that occur within their borders are Colorado, California, Florida, New York, New Mexico, and Massachusetts; Washington, D. C., should also be added; New Mexico and Massachusetts leading, the former having 73 and the latter 74 species. I. means introduced species; N., native species. The year placed after the author's name is the year in which the insect was described, and the other is the year when it was first known to occur in the State. The foreign distribution will only be given when found necessary.

COCCIDÆ.

Monophlebina.

(1) *Icerya Purchasi*, Mask; 1878-1879. I.

This species was discovered by Dr. Hagen in a greenhouse at Cambridge, Mass., and this is the only instance that I know of its being found in this State. It is quite common in California.

Coccinae.

- (2) *Eriococcus quercus*, Comst.; 1881-1898. N. Syn. *Rhizococcus quercus*, Comst.

I found this coccid last year at Andover and Lawrence, Mass., on young white oak and *Vaccinium corymbosum*. It is found in Florida and Georgia on Laurel oak (*Quercus laurifolia*) and *Q. aquatica*, Gallberry and Grass. I have reared a *Chiloneurus* sp. from this coccid.

- (3) *Eriococcus azaleae*, Comst.; 1881-1898. N.

Found at Methuen, Mass., on *Cratægus coccinea*. It has been taken at New York and Michigan on wild and cultivated Azalea; also at Washington, D. C., in the department greenhouses on Azalea.

- (4) *Gossyparia ulmi*, Geoff.; 1764-1887. I.

A very common pest. Found at Amherst, Boston, Brookline, Brighton, Concord, Springfield, Methuen, Andover, and Lawrence, Mass., on native white elm, Scotch elm, and Camperdown elm; also found at Washington, D. C.; New Jersey, Maryland, New York, Michigan, Western Nevada, and California, on *Ulmus americana*, *U. racemosa*, *U. campestris*, *U. montana*, and *U. fulva*. It is parasitized by *Cocco-phagus gossypariae*, How., and has been reared by Mr. Cooley, at Amherst, Mass., 1898.

- (5) *Ripersia lasii*, Ckll.; 1896-1894. N.

Very often found at Lawrence, Methuen, Andover, North Andover, Dracot, and Haverhill, Mass., in nests of *Lasius americanus*, Gm., and *Lasius flavus*, L.; also found feeding on the roots of China asters at Lawrence; here also attended by *Lasius americanus*. All of the genus *Ripersia* found in Massachusetts are subterranean species and attended by ants. No males of the genus have been found by me. It is presumed that they are viviparous. Mr. R. J. Crew in 1897 found this coccid at Toronto, Canada, in nest of *Lasius americanus*, Gm.

- (6) *Ripersia Kingii*, Ckll.; 1896-1894. N.

It is abundant in ant-nests at Lawrence, Dracot, Methuen, and Springfield, Mass., found at the latter place by Dr. George Dimmock in 1898. Generally found in nests of *Lasius flavus*, L., and *Lasius claviger*, Rog.

- (7) *Ripersia flaveola*, Ckll.; 1896-1895. N.

A very common species found at Lawrence, Methuen, Dracot, and Haverhill, Mass., in nests of *Lasius claviger*, Rog.

- (8) *Ripersia Blanchardi*, King and Ckll.; 1897-1897. N.

Large and not often met with; found at Haverhill, Mass., in nest of *Lasius claviger*, Rog.

- (9) *Ripersia minima*, Tinsley and King; 1899-1898. N.

This is the smallest of the *Dactylopinæ* known; found at Lawrence, Mass., in nests of *Lasius americanus*, Gm.

- (10) *Dactylopius citri*, Risso.; 1813-1879. I. Syn. *Dactylopius phyllococcus*, Ashm.; *Lecanium phyllococcus*, Ashm.; *Dactylopius destructor*, Comst.; *farinosus*, Deg. (?); and *brevispinus*, Targ.

A first-class pest in all greenhouses at Lawrence, and no doubt in all the greenhouses in this State; very common on *Coleus* plants, *Cacti*, *Geranium*, *Ivy-Hedera*, and also found in ants' nests. It is recorded from Washington, D. C.; New Mexico, California, Florida, Colorado, and Minnesota, on *Habrothamnus*, *Solanum jasminoides*, *Orange*, *Croton*, *Arabian* and *Liberian Coffee-plants*.

- (11) *Dactylopius adonidum*, L.; 1769-1828. I. Syn. *longispinus*, Targ.; *Coffeæ*, Ledern; *Longifilis*, Comst.

This is another very common pest at Lawrence, Mass., in all greenhouses on palms and *Coleus*; it is found in ants' nests at Lawrence; at Washington, D. C., and New Mexico on a house fern. It is quite safe to say that the two last coccids cited can be found in nearly all of the greenhouses in Mass., although we have no such record, and perhaps in nearly every State if looked for.

- (12) *Dactylopius sorghiellus*, Forbes; 1885-1896. N. Syn. *Dactylopius Kingii*, Ckll. (variety).

Frequently found in nests of *Lasius claviger*, Rog.; *L. flavus*, and *L. americanus*, Gm., at Methuen, Lawrence, and Haverhill, Mass., on corn roots, leaf sheath and leaf sorghus, on roots of June and timothy grass, and attended by ants.

- (13) *Dactylopius sorghiellus*, var., *Kingii*, Ckll.; -1896. N.

Found with the same ants and in the same locality.

- (14) *Dactylopius claviger*, King and Tinsley; 1897-1896. N.

This species is found at Andover and Methuen, Mass., in nests of *Lasius claviger*, Rog.

- (15) *Dactylopius Cockerelli*, King and Tinsley; 1898-1896. N.

A very common species; found at Lawrence, Methuen, Andover, and Dracot, Mass., in nests of *Lasius flavus*, L.; *L. claviger*, Rog.; and *L. Americanus*, Gm. The above three species are subterranean and their food plants are as yet unknown.

- (16) *Dactylopius pseudonipæ*, Ckll.; 1897-1898. N.

This species seems to be quite common at Lawrence in greenhouses on various species of palms, and is also found in Michigan and California on palms in greenhouses.

- (17) *Phenacoccus aceris*, Sign.; 1875-1894. I. Syn. *Pseudococcus aceris*, Sign.

A very injurious species to Maples at Springfield, Jamaica Plains, Brookline, Norwood, and Holyoke, Mass. It is recorded from Rhode Island, Pennsylvania, New Jersey, Maryland, and Illinois, and is preyed upon by a coccinellid (*Hyperaspis signata*, Oliv.), observed by R. A. Cooley at Springfield, Mass., 1898.

- (18) *Phenacoccus americanae*, King and Ckll.; 1897-1897. N.

This has only been found once in a nest with *Lasius americanus*, Gm., at Andover, Mass.

- (19) *Sphaerococcus sylvestris*, Ckll. and King; 1898-1898. N.

Found on a young white oak at Methuen, Mass. This is the first species of the genus to be found in North America. The type is in the national collection of Coccidæ at Washington. The genus is known from Australia to Japan.

Asterolecaniinae.

- (20) *Asterolecanium quercicola*, Bouche; 1851-1898. I. Syn. *Asterodiaspis quercicola*, Bouche.

A common species at Middlesex Fells, on white oak and swamp oak, at Medford on English oak, and Worcester on golden oak. Mr. A. H. Kirkland in 1898 reared several examples of a very interesting imported parasite, *Habrolepis Dalmannii*, from the Coccidæ at Middlesex Fells. All the parasites mentioned in this paper have been studied by Dr. Howard. The coccid has been found at Washington, D. C.; New York, and Connecticut, on imported European oaks and American white elm.

THE STENOPELMATINÆ OF THE PACIFIC COAST.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

A greater variety of generic types will be found among the Stenopelmatinæ of the Pacific Coast of the United States than in any other district of equivalent area in our country. I have therefore thought it well to make a list of them in connection with the description of a few new forms from that region. We owe our knowledge of the Orthoptera of that district mainly to the collections of Messrs. Henry Edwards, Behrens, Crotch, and latterly Morse.

STENOPELMATINI.

In my Guide to the . . . N. A. Orthoptera (1897) I carelessly overlooked the genus *Cyphoderris* Uhler, which belongs to the Stenopelmatini, but to a different group of genera from that to which *Stenopelmatinus* belongs. The two groups may be distinguished by the following characters :

Fastigium of vertex confused with the front of the head, not produced between the antennæ; pronotum broader in front than behind, the front margin sinuate, with an intramarginal sulcus; fore coxæ unarmed; fore tibiæ with no foramina. *Stenopelmati*.

Fastigium of vertex separate from the front, produced more or less between the antennæ; pronotum not broader in front than behind, the front margin straight or convex, with no intramarginal sulcus; fore coxæ armed with a spine; fore tibiæ furnished with foramina on both faces or at least on the inner face. *Anostostomata*.

Stenopelmati.

Represented in the United States only by the genus *Stenopelmatinus*, nearly all the species occurring in our country being found on, and most of them confined to, the Pacific Coast.

Stenopelmatinus Burm.

Four species of this genus were credited to the United States, and all to the Pacific Coast, in Brunner's monograph of the Stenopelmatinæ (1888), and he did not recognize the species described by Haldeman in 1852 as *fuscus*, by Thomas in 1872 as *fasciatus*, or by Scudder in 1876 as *oculatus*, all from the region to the east of the Sierra Nevadas. The first of these it is impossible to determine, but types of the other two are before me. The species found in the United States and Canada may be separated by the following table :

- a*¹. Hind tibiæ armed with five spines* on inner margin above.
- b*¹. Head relatively small; hind tibiæ relatively long, being about or nearly twice as long as the pronotum on the mediodorsal line; the upper inner spurs of same much longer than the metatarsus..... *longispina*.
- b*². Head distinctly broader than pronotum; hind tibiæ relatively short, being hardly or not more than half as long again as the pronotum on the mediodorsal line.
- c*¹. The apical spine on the inner margin of the hind tibiæ markedly smaller than the preceding.
- d*¹. Hind tibiæ subrotundate above, the fourth spine of inner margin (counting from base) more widely separated from the third than the others from their neighbours, those of the outer margin two, rarely three, in number, the upper inner spur as long as the metatarsus..... *irregularis*.
- d*². Hind tibiæ sulcate or subsulcate above, the spines of the inner margin equidistant, those of the outer margin four in number, the upper inner spur much shorter than the metatarsus. *californicus*.
- c*². The apical spine on the inner margin of the hind tibiæ but little or not smaller than the preceding.
- d*¹. Outer margin with 5-6 spines..... *fasciatus*.
- d*². Outer margin with 2-4 spines..... *oculatus*.
- a*². Hind tibiæ with less than five spines on inner margin above; head not broader than pronotum.
- b*¹. Hind tibiæ with four equal spines on inner margin above, three on outer margin; head and pronotum nearly uniform castaneous, unpictured..... *histrio*.
- b*². Hind tibiæ with three spines on inner margin above, two on outer margin; head and pronotum castaneous, heavily pictured (on the head longitudinally) with dark fuscous..... *pictus*.

1. *Stenopelmatus longispina* Brunn.—A well marked species, readily recognized by its long hind tibiæ; the inner calcaria of the same are also exceptionally long, but in this it agrees with the next species. It was originally described from Vancouver Island. I have seen specimens from Fort Boise, Or., Suckley; Drain, Sept. 11, and Roseburg, Douglas

*Occasionally, by anomaly, there are but four spines on one or both legs. See below, under *S. oculatus*.

Co., Or., Sept. 10, A. P. Morse; California, Uhler, Dyar, Edwards; Coast of California, Trowbridge; and San Diego, Cala, Palmer.

2. *Stenopelmatus irregularis* Brunn.—This was described from Mazatlan, Mex., Arizona and California. I have specimens from near Lake Tahoe, Nevada, Sept., Henshaw; California, Edwards, Behrens, Dyar; San Francisco, Cal., Edwards, Bischoff; Sonoma and Marin Counties, Cal., Osten Sacken; San Bernardino, Cal., Feb., Palmer, and Ft. Tejon, Cal., Uhler.

3. *Stenopelmatus californicus* Brunn.—Originally described from Vancouver only, and notwithstanding its name, now first recorded from California. I have before me specimens from Drain, Sept. 11, and Roseburg, Douglas Co., Or., Sept. 10, A. P. Morse; Ft. Crook, Cal.; Mill Valley, Cal., Aug. 22, Morse; Nevada Valley to Cloud's Rest, Yosemite Valley, Cal., Aug. 12, Morse; 8-mile station, road to Yosemite Valley, Cal., Aug. 9, Morse; Tehachipi, Kern Co., Cal., Aug. 2, Morse; South Santa Monica, Los Angeles Co., Cal., Rivers (Morse); and San Diego, Cal., July.

Stenopelmatus fasciatus Thom.—I have seen only the single existing type, a female, in the U. S. National Museum, which comes from southern Idaho. It does not agree with Thomas's description in the spines of the hind tibiæ, as it has five on the inner carina and five or six (differing on the two legs) on the outer carina; while he gives five on the inner and four (♂) or three (♀) on the outer carina. It is therefore doubtful whether all his specimens belonged to one species; if they did not, the others probably belonged to the next species, as it is the only other one known from east of the Sierra Nevadas, except in the south. Thomas credits the present species to Wyoming and Utah as well as Idaho.

I introduce the species here to complete the reckoning of the forms found in the United States and Canada, but prefix no number, as it is not known from the Pacific Coast.

4. *Stenopelmatus oculatus* Scudd. (*S. hydrocephalus* Brunn.)—The specimens I have seen come from Harrison, Sioux Co., Neb., Bruner; Wyoming, U. S. Nat. Mus.; Utah, Suckley, Packard; Spring Lake Villa, Utah Co., Utah, Aug. 1-4, Palmer; St. George, Washington Co., Utah, Apr. 1-12, Palmer; Mt. Trumbull, Utah, June 7-10, Palmer; Mokiak Pass, Utah, Apr. 20-30, Palmer; Nevada, Akhurst, Edwards; Virginia City, Nev., Seckels; Carson Valley, Nev., Simpson; Ruby

Valley, Nev., Ridgway; western Washington, U. S. Nat. Mus.; California, Edwards; El Dorado Co., Cal., 4,000 feet, Gissler; Sonoma and Marin Counties, Cal., Osten Sacken; San Francisco, Cal., Edwards; between San Luis Obispo and San Simeon Bay, Cal., Palmer; Ft. Tejon, Cal., Uhler; San Bernardino, Cal., Palmer; Ehrenberg, Colorado River, Ariz., Palmer; Fort Buchanan, Southern Arizona, Palmer; Cantonment Burgoyne, mountains of New Mexico; Las Cruces, N. Mexico, Cockerell; Eagle Creek, White Mts., Lincoln Co., N. Mex., 7,000 feet, Wootton (Morse). This is our most widespread species.

It is possibly not distinct from the preceding, in which case the name *fasciatus* has precedence. It is somewhat more variable than the other species in the number of spines on the hind tibiæ, and there are even occasionally only four on the inner margin. The single specimen from Ft. Tejon, quoted above, has the inner upper calcaria of the hind tibiæ distinctly longer than the metatarsus; it is a large male, measuring 39 mm. in length.

5. *Stenopelmatus histrio* Sauss.—This Mexican species extends into our territory. Specimens before me come from California, Edwards; San Francisco, Cal., Edwards, Bischoff; Sonoma and Marin Counties, Cal., Osten Sacken; Pacific RR. explorations along Lat. 38°, Beckwith; and Mexico, Sumichrast.

6. *Stenopelmatus pictus*, sp. nov.—Castaneous, heavily infuscated over the whole upper surface of the body. Head not broader than the pronotum, longitudinally broadly striped with dark fuscous over the vertex, hardly encroaching on the smooth genæ, nor quite reaching the back of the head; front feebly and sparsely punctate; eyes but little prominent, briefly subpyriform. Pronotum subquadrate, the front portion but little broader than the rest, the hinder angles broadly rounded, the disk, excepting before the submarginal sulcus, almost entirely dark fuscous, sometimes threaded with rufo-castaneous. Hind femora short and broad; hind tibiæ broad and subequal on a side view, the outer face subrotundate, the upper plane, furnished above on the inner carina with three not very large, equidistant and subequal but distally enlarging spines, on the outer carina with two similar ones; inner calcaria not very stout, even slender in the male, increasing a little in length from below upwards, the upper as long as (♂) or nearly as long as (♀) the metatarsus. Dorsal plates of abdomen dark fuscous, edged posteriorly with rufo-castaneous.

Length of body, ♂ 16.5 mm., ♀ 25 mm.; pronotum, ♂ 5 mm., ♀ 5.75 mm.; hind femora, ♂ 8 mm., ♀ 9 mm.; hind tibiæ, ♂ 8 mm., ♀ 9 mm.

1 ♂, 3 ♀.—California; San Francisco, Cal., Edwards.

This species differs from the Mexican *S. vicinus*, to which it appears to be most nearly allied, in its dorsal colouring, smooth genæ, stout and non-sulcate hind femora, the fewer spines on the outer carina of the hind tibiæ, and its longer, inequal calcaria.

Anostostomata.

To this group the United States can furnish but a single genus.

Cyphoderris Uhl.

As stated above, this genus was accidentally omitted from my Guide to the . . . N. A. Orthoptera, but its position therein is here indicated.* It falls in the vicinity of *Pherterus* Brunn., found in the Antilles and Brazil. It is the only one of our *Stenopelmatinæ* which is not apterous.

7. *Cyphoderris monstrosa* Uhl.—Oregon. I have seen only Uhler's types. Thomas records it from Wind River, Wyoming.

RHAPHIDOPHORINI.

Represented in the United States and on the Pacific Coast by two groups, *Tropidischia* and *Ceuthophili*.

Tropidischia.

The sole representative of this group occurs only on the Pacific Coast.

Tropidischia Scudd.

A remarkable long-legged form, the hind tibiæ quadrangulate, with spines on each margin, and represented by a single species.

8. *Tropidischia xanthostoma* Scudd.—Crescent City, Del Norte Co., Cal., Agassiz; Mendocino, Cal., Behrens; Philomath, Benton Co., Oregon, Sept. 15, A. P. Morse.

Ceuthophili.

This group contains the bulk of the Pacific Coast, and indeed of North American, *Stenopelmatinæ*; most of them will be found in my paper on the North American *Ceuthophili* (Proc. Amer. Acad. Arts Sc.,

*It is well to state here that I also overlooked Uhler's genus *Camptonotus*, described in the same paper with *Cyphoderris*. It is identical with Brunner's genus *Neortus*, and has priority.

XXX., 17-113, 1894). One new genus has been established by Sausure and Pictet since its publication, but it may perhaps not be distinct from *Ceuthophilus*. *Hadencoccus* Scudd., and *Daihinia* Hald., are the only North American genera not known to occur on the Pacific Coast.

Ceuthophilus Scudd.

Undoubtedly many species of this genus remain to be discovered on the Pacific Coast. The following include all known to me up to the present time :

9. *Ceuthophilus celatus* Scudd.—Originally described from Siskiyou Co., Shasta Co., San Francisco, and Los Angeles Co., Cal. Mr. Morse brought specimens from Victoria, B. C., Sept. 29, and Divide, Lane Co., Oregon, Sept. 12.

10. *Ceuthophilus agassizii* Scudd.—Recorded from islands in the Gulf of Georgia, between Vancouver and Washington; Vancouver Island, British Columbia, and Oregon.

11. *Ceuthophilus polluticornis*, sp. nov.—Allied to *C. mexicanus* and *C. pallescens*, but much darker than they, castaneous or testaceous, heavily and irregularly mottled with fuscous; hind femora testaceous, dotted with luteous and more or less clouded with fuscous, with a large and conspicuous dark fuscous patch on the lower half of the outer face, at least in the male, the lower margin luteous basally. Antennæ very slender, about or nearly three times as long as the body, luteous or testaceous except basally, where for a distance about equal to the breadth of the body, excepting generally in the female, they are dark rufo-fuscous. The legs are not very slender. Fore femora no stouter than middle femora, about a fifth longer than the pronotum and less than half as long as the hind femora, the inner carina with only a short subapical spine. Middle femora with only a single short spine on either inferior carina, besides the longer subapical spine of the front and the genicular spine of the hind carina. Hind femora not so long as the body and more than twice as long as the fore femora, rather stout and with hardly any equal distal portion, about three (♂) or three and a half (♀) times as long as broad, with but few scattered raised points along the upper surface in the male, the outer inferior carina serrulate, with a rather large preapical spine (♂) or unarmed, with a broad tooth or angulation in place of the spine (♀), the inner spinulose with a similar spine more distant from the tip (♂) or with three or four subapical spinules (♀). Hind tibiæ straight, slightly longer than the femora, armed beneath with a pair of

subapical as well as apical spines; spurs subopposite, the basal pair a little before the middle of the tibiae, scarcely longer than the tibial depth, set at an angle of about 40° with the tibiae, and about 100° with those of the opposite side; inner middle calcaria as long as the metatarsus, twice as long as their mates. Hind tarsi about two-fifths as long as the tibiae, the first joint as long as the rest together, the second twice as long as the third. Cerci tapering regularly, not more than half as long as hind femoral breadth. Ovipositor about four-fifths as long as the hind femora, nearly straight and slender, but apically upcurved and finely pointed, the inner valves very bluntly and feebly crenulate.

Length of body, ♂ 13 mm., ♀ 12 mm.; pronotum, ♂ 3.75 mm., ♀ 4 mm.; fore femora, ♂ 4.4 mm., ♀ 4.75 mm.; hind femora, ♂ 10 mm., ♀ 10.5 mm.; hind tibiae, ♂ 10.5 mm., ♀ 11.25 mm.; ovipositor, 8 mm.

2 ♂, 5 ♀.—Eight-mile Station, about 5,500 feet, on the road from Wawona to the Yosemite Valley, Cal., A. P. Morse.

This species is easily recognized, at least in the male sex, by the antennae discoloured at base and the dark patch on the hind femora.

12. *Ceuthophilus vinculatus* Scudd.—There are specimens in the National Museum from California and Washington, and the Cambridge Museum has a pair, apparently belonging here, from Santa Barbara, Cal.; the species is also found in Nevada, Iowa, and Nebraska.

13. *Ceuthophilus testaceus* Scudd.—A single specimen, apparently of this species, was taken at Los Angeles, Cal., July 29, by A. P. Morse. It had previously been known only from Missouri, Nebraska, and Wyoming.

14. *Ceuthophilus californianus* Scudd.—This has been reported from Vancouver Island, and from many places in California, in Contra Costa, Sonoma, Marin, San Francisco, Alameda, San Mateo, Santa Clara, Santa Barbara, Los Angeles and San Bernardino Counties, as well as from Utah and Arizona. Mr. Morse brought home a specimen from Corvallis, Benton Co., Oregon, taken April 19. (See below, under *Hemiudeopsylla californiana*).

15. *Ceuthophilus pacificus* Thom.—This has been taken by many persons in California without closer specification of locality, and by others in Contra Costa and Los Angeles Counties, and at Lake Tahoe. It also occurs in Nevada.

16. *Ceuthophilus salebrosus*, sp. nov. — Dark luteous, profusely clouded and more or less spotted with dark fuscous. Antennæ slender, fully half as long again as the body, castaneous or rufo-castaneous at base, luteous beyond, about every tenth joint pallid. Legs rather short. Fore femora not stouter than the middle femora, about a third longer than the pronotum and a little less than half as long as the hind femora, the inner inferior carina with a short subapical spine. Middle femora with a single small subapical spine on each inferior carina, besides a genicular spine behind. Hind femora considerably shorter than the body, a little more than twice as long as the fore femora, not very stout, a little less (δ) or a little more (φ) than three times as long as broad, the apical fifth (φ) or sixth (δ) equal, in the male heavily scabrous with minute raised points in oblique rows and especially along the upper margin, the outer inferior carina with an oblique preapical prominent denticle, immediately preceded by obscure serrulation (δ) or obscurely serrulate in distal half (φ), the inner carina distantly, very delicately and minutely spinulose (φ) or with an oblique prominent compressed denticle in the middle of the distal half, preceded by serrulations which almost mount the proximal face of the denticle (δ). Hind tibiæ strongly and sharply bowed just before the middle and so shorter than the hind femora, a little expanded before the bend (δ) or straight, simple, and slightly longer than the femora (φ), armed beneath with a pair of apical and a pair of subapical spines; spurs opposite or subopposite, the basal pair somewhat before the middle of the tibia, about as long as the tibial depth and divaricating but little. Hind tarsi nearly half as long as the tibiæ, the first joint as long as the rest together, the second nearly three times as long as the third and about as long as the fourth. Cerci of female stout in the basal half, beyond tapering, at least two-thirds as long as the hind femoral breadth. Ovipositor nearly straight, gently tapering in the basal half, beyond equal for a brief space, and then tapering more rapidly to a fine point and upcurved, less than two-thirds as long as the hind femora, the inner valves serrulate, with no apical hook.

Length of body, δ 10 mm., φ 12 mm.; pronotum, δ 3 mm., φ 3.25 mm.; fore femora, δ φ 4 mm.; hind femora, δ 8.25 mm., φ 8.5 mm.; hind tibiæ, δ 7.25 mm., φ 9 mm.; ovipositor, 5 mm.

1 δ , 1 φ .—Tenino, Thurston Co., Washington, Sept. 24, A. P. Morse,

The dorsal surface of the abdomen of the male, as in *C. pacificus* and *C. henshawi*, to which this species is closely related, is not smooth as in other species of *Ceuthophilus*, and like them also the fastigium of the vertex is developed as a triangular prominence pushed between the antennal scrobes. In the present species the roughnesses of the abdomen are found from the third segment backward and consist of transverse series of slightly elongated tubercles on the posterior margin of the segments.

17. *Ceuthophilus henshawi* Scudd.—It has been reported from Vancouver Island, Washington, Oregon, and from Placer, Marin, Kern, and Los Angeles Counties in California. It was taken at Tenino, Wash., Sept. 24, by A. P. Morse.

Hemiudeopsylla Sauss.—Pict.

This genus was founded primarily on a Mexican species, to which three others, one from Mexico and two from central California were added. I have been unable to identify the Californian species with any thing I have seen, but add them to the list.

18. *Hemiudeopsylla platyceps* Sauss.—Pict. —Marin, Co., California.

19. *Hemiudeopsylla californiana* Sauss.—Pict.—Marin Co., California. This was supposed by the authors to be my *Ceuthophilus californianus* (see above), but their description does not agree with my types, and the specific name must be changed to a new one unless it belongs with some previously described species, which I think improbable.

Phrixocnemis Scudd.

20. *Phrixocnemis validus* Scudd.—California, H. Edwards. Known hitherto by a single specimen only.

Eudeopsylla Scudd.

21. *Eudeopsylla nigra* Scudd.—A single specimen has been taken in El Dorado Co., Cal., 4,000 feet, by Gissler; otherwise it is known only from the region between the Mississippi Valley and the Rocky Mts., in Manitoba, Minnesota, Dakota, Illinois, Iowa, Nebraska, Kansas, Missouri and Colorado, though one specimen has been brought from Arizona.

Gammarotettix Brunn.

22. *Gammarotettix bilobatus* Thom., sp.—This is known only from central and southern California, having been taken in Lake, Sonoma, Marin, San Mateo, Santa Clara, Los Angeles and San Diego Counties.

CHRYSOPHANUS THOE OF GRAY — WHY IS IT NOT
C. HYLLUS, CRAMER?

BY A. G. BUTLER, PH. D., BRITISH MUSEUM, LONDON, ENGLAND.

In my Catalogue of Fabrician Diurnal Lepidoptera, p. 173, I (in 1869) unhesitatingly identified examples of a *Chrysophanus* in the British Museum collection with Cramer's *Papilio hyllus*, and at the present time I do not see the slightest valid reason for altering that decision.

In his "Butterflies of the Eastern United States," Dr. Scudder, at the end of his synonymy of *Chrysophanus thoe*, says, "Not *Papilio hyllus*, Cram.;" but, in his account of the species, I find no reason adduced for this assumption, though I can readily believe that the incorrect locality, "Smyrna," given by Cramer, and the somewhat careless drawing of the spots across the disk of primaries, may have influenced him.

That *C. hyllus* is not a European type, in the Staudingerian sense of the term, may be concluded from the fact that it is excluded from Staudinger's Catalogue, and I think I may safely affirm that there is no European species which at all nearly approaches it. On the other hand, anyone acquainted with the utter unreliability of many of Cramer's localities for his species, and with the unequal merit of his drawings, would have no hesitation in at once pronouncing his figures of *P. hyllus* to be a representation of the female of *C. thoe*.

If *C. hyllus* and *C. thoe* are not one and the same species, what is Cramer's insect? Ruhl, in his "Palæarktischen Gross-schmetterlinge," 1892, ignores it entirely; indeed, by general consent, the students of European and allied butterflies are decided as to its having nothing to do with the fauna of Asia Minor or Europe.

If, therefore, *C. hyllus* is not *C. thoe*, it must be an extinct species closely related to the latter, for there is nothing else in the least approaching it. If this conclusion commends itself to American Lepidopterists, well and good, but they must not mind being classed with those who consider it "folly to be wise."

CABINET PEST DETERRENT.

One of the most worrying things an entomologist has to put up with is that after carefully making a collection his most valued specimens are nearly eaten away, either with mites or the Dermestes beetle.

For the benefit of my brother enthusiasts, let me give briefly my personal experience. Last June captures at light were very good and numerous. Many rare insects were taken and set out. The setting-boards were placed on a shelf. By the morning the contents of three boards were literally eaten away by large black ants, house flies, and the little black and orange beetle. If my thoughts had been candidly expressed I am afraid my reputation would have been irretrievably lost, so I hunted around for a remedy and was soon successful in finding one.

The ingredients are —

Corrosive Sublimate, 2 dr.;

Turpentine, $\frac{1}{2}$ oz.;

Rectified Spirits of Wine, $3\frac{1}{2}$ ozs.

These are simply mixed together.

Directions.—First shake the bottle briskly. Take a small camel's-hair brush and apply a thin streak of this preparation under the body of each insect, taking care not to touch the wings. (Better try the effect on some common moths first.)

Now comes the test of ten months. The preparation was applied to several *Cecropiās*, while others were placed beside these without being so treated. These were all laid on a shelf. Next morning the bodies of the unprepared moths were mere shells. Ants and beetles were having no end of a feast. Not so with the others. They are there yet and not a sign of a mite, beetle or ant to be seen.

As regards boxes, cabinets, etc., apply a thin line of the preparation all around the sides, forming, as it were, a cordon. No other chemical is required in the cabinet.

If specimens are already infected. run some gasoline into the boxes and close them up. This will kill the larvæ and mites in a few minutes. Camphor is utterly useless. In re-papering setting-boards or drawers use a little of the solution in the paste. Be careful not to use methylated spirits.

A. E. NORRIS, Montreal.

BOOK NOTICES.

DR. SKINNER'S CATALOGUE OF NORTH AMERICAN BUTTERFLIES.

It is now nearly fifteen years since Mr. W. H. Edwards issued his "Revised Catalogue of the Diurnal Lepidoptera of America north of Mexico," and it cannot therefore be said that the new "Synonymic Catalogue of the North American Rhopalocera," issued on 15th December last by Dr. Henry Skinner, appeared prematurely. In this catalogue, Dr. Skinner has followed very closely on the lines laid down by Mr. Edwards in his lists, so far as the species are concerned, and with a conservatism which is striking when compared with his rather sweeping radicalism as expressed in his article, "Impressions Received from a Study of our North American Rhopalocera," in *Jour. N. Y. Ent. Soc.*, IV., 107. A few, probably too few, species have been placed in the synonymy, but it seems strange, in view of what the author has written elsewhere, to see *Argynnis Artonis*, *Clio*, *Opis*, *Bischoffii*, *Arge* and *Eurynome*, all standing as distinct species. The order of the families and subfamilies has, however, been entirely changed, following that adopted by the same author in the Check List of 1891, beginning with the *Danainæ*, and the other *Nymphalid* subfamilies following in order the *Satyrinæ* and *Libytheinæ* closing the series, the *Erycinidæ*, *Lycænidæ*, *Papilionidæ* and *Hesperiidæ* following in the order given.

This grouping of the families, if not altogether satisfactory, and it is not so to the reviewer, seems certainly much more reasonable than that which places at the head as the highest type of butterfly the *Satyrinæ*, some of the species of which pupate in rudimentary cocoons.

One very excellent feature of the work is the giving a separate line to each reference, which greatly aids the eye in finding what is wanted, but more care might have been exercised in giving the references, as quite a number of errors in the volumes or pages occur. One such error, which may be cited as a sample, occurs on page 52 under *Chrysophanus Dorcas*, where *Scud. But.* 3, 1380, should be 1830.

Other misprints occur, at least it seems probable that spelling *Phæton* *Phæton* is chargeable to the printer rather than to the author.

In a few cases references are given which are of less interest than some which have apparently been overlooked, but the citations are so very full that really very little of interest seems to have been omitted.

It will be noticed that under *Colias Palæno* is placed *Var. Werdandi*,

Herr.-Schaff. This is following the supplement of Kirby's Catalogue, but Dr. Staudinger and Mr. Elwes give Var. *Werdandi*, Zett., as a variety of *Colias Nastes*, Boisd.

The lists of authors and of works quoted are very complete, and the index giving both species and genera, the latter in heavy type, is very satisfactory. Altogether it is a most useful work and really indispensable to every worker on the North American Rhopalocera. It is issued by the American Entomological Society as part of their Transactions, but may be obtained separately from the author for \$1.00. H. H. L.

CONTRIBUTIONS TO THE THEORY OF WARNING COLOURS AND MIMICRY.
—By Frank Finn, B.A., F. Z. S., Deputy Superintendent of the Indian Museum, Calcutta. (Reprint from the Journal, Asiatic Society of Bengal.) Vols. LXIV., LXV., LXVI., LXVII., Part II., 1895-97.

In this little book of 84 pages, Mr. Finn has brought together a number of separates of his papers, printed in the Journal of the Asiatic Society of Bengal, on this very interesting subject. The experiments were made, largely, with birds, but a lizard, *Calotes versicolor*, was used in one series, and a frog, *Rana tigrina*, and a Tree-Shrew, *Tupaia ferruginea*, in another series; in this last only a single individual of each species being used. The insects experimented upon were mainly butterflies, including largely, of course, such as are supposed to be distasteful or warningly or protectively coloured.

It is obviously impossible to go into the details of the many experiments carried out by Mr. Finn, and, therefore, only a synopsis of the results obtained are included here. As regarding the, in some instances, somewhat unsystematic experiments in the case of birds, Mr. Finn explains that "experimenting on this subject was not always his main object in keeping the birds at all," which leads us to suppose that, sometimes at least, the results given are what might be termed bi-products, which, instead of detracting from their value, might be regarded as adding thereto, as he would certainly be free from all mental bias, so difficult to avoid in cases where one has laboured long and intensely on a very interesting problem.

In regard to the lizard, *Calotes*, he states that "the behaviour of these certainly does not appear to afford support to the belief that the butterflies, at any rate, usually considered nauseous, are distasteful to them."

In regard to the *Tupaia*, Mr. Finn states that this animal has a very strong objection to the "protected" *Danainæ* and *Papilio aristolochiæ*, as it so constantly refused them, and in case of the former, absolutely, and not, as with the birds, merely showing dislike by preferring other species. Of the tastes of the frog, sufficient data was not obtained to warrant any conclusions.

Regarding birds (the Babblers especially) the author concludes as follows :

"1. That there is a general appetite for butterflies among insectivorous birds, even though they are rarely seen when wild to attack them."

"2. That many, probably most species, dislike, if not intensely, at any rate in comparison with other butterflies, the 'warningly-coloured' *Danainæ*, *Acræa violæ*, *Delias eucharis*, and *Papilio aristolochiæ*; of these the last being the most distasteful, and the *Danainæ* the least so."

"3. That the mimics of these are at any rate relatively palatable, and that the mimicry is commonly effectual under natural conditions."

"4. That each bird has to separately acquire its experience, and well remembers what it has learned."

"That therefore on the whole, the theory of Wallace and Bates is supported by the facts detailed," in these papers, "so far as they deal with birds (and the one mammal used)." "Professor Poulton's suggestion that animals may be forced by hunger to eat unpalatable forms is also more than confirmed, as the unpalatable forms were commonly eaten without the stimulus of actual hunger—generally," he adds, "without signs of dislike," which shows that, under the stress of hunger, they would likely exhibit even less nicety of selection.

To future experimenters, Mr. Finn offers the following hints, derived from his own experiments :

"1. Use animals at liberty for experimenting with if possible."

"2. If these are not available, confine your subjects singly, and feed them well and *naturally*, letting them be neither hungry nor pampered. Cages should be of portable size (about two feet every way) and made (for birds) of half-inch mesh wire netting with plain wooden floor without a tray. This is to prevent insects from getting out or being concealed."

"3. Use wild-caught specimens in preference to hand-reared ones."

"4. Remember that the best and often the only way to determine an animal's tastes is to offer it a choice."

CORRESPONDENCE.

LARVÆ OF XYLIDÆ.

SIR,—The Wiener Ent. Zeit. for March, 1899 (Vol. XVIII., p. 41). publishes an article by Mr. F. W. Konow, in which my description of *Pleuroneura aviingrata* is attacked. I do not desire to enter any controversy in which the use of abusive language prevails, but as Mr. Konow asks some direct questions about the larva, I propose to answer them for his information. 1. The abdominal feet are present on all the segments, but quite small on the first and ninth, so that from the living larva I did not describe them on these segments; in the inflated larva they are fairly distinct. Compare Mr. Young's description of *Macroxyela ferruginca* (CAN. ENT., XXXI., 41), where the feet are even more prominent. 2. There are no anal stylets present. 3. The antennæ are 6-jointed, situated just below and a little inward from the eyes. 4. The palpi are visible on the outside of the jaws when these are closed. 5. The length of the mature larva is about 27 mm. 6. Mr. Konow asks how the larvæ may be distinguished from the Lydidæ. I refer to my definition of the Xyelids, CAN. ENT., XXX., 176.

HARRISON G. DYAR.

Department of Agriculture,
Victoria, B. C., Feb. 28th, 1899.

To the Editor Canadian Entomologist :

SIR,—I have read with much interest Prof. Enzo Reuter's article in the January number of the CANADIAN ENTOMOLOGIST, referring to the occurrence of the apple fruit miner, *Argyresthia conjugella*, in Finland, and I think the enclosed letter from Prof. Matsumura, of Japan, may prove of interest to the readers of the CANADIAN ENTOMOLOGIST. You will notice that his account of the Japanese pest, particularly with regard to its attack, tallies very well with what we have observed in British Columbia. The cocoon sent by Prof. Matsumura I am saving, and hope to succeed in breeding the imago next spring. I am unable to determine positively by the cocoon if the insects are identical. I think that the important point as to the mode of egg-laying must be determined before we can feel satisfied with our knowledge of it. All of Prof. Reuter's notes are of great interest to us here, but I cannot help thinking that the mention made of this insect attacking plums is a mistake, some observer having probably confounded the larvæ of *Semasia prunivora* with those of *Argyresthia*.

E. A. CAREW-GIBSON,

Imperial Agricultural College,
Sapporo, Japan, Dec. 7, 1898.

DEAR SIR,—I have duly received your letter. Dr. J. Fletcher, of Ottawa, Canada, has already suggested to me that *Larverna herellera* might be identical with your British Columbian *Argyresthia conjugella*, Zell. I have received from him a report concerning it, and am convinced that it must be quite identical. The mode of affecting the plant differs from that of yours, as I have mentioned in a paper published by the U. S. Division of Entomology (Bull 10, U. S. Div. of Ent., 1898), but some larvæ in this country seem to attack the fleshy part of the apple just in the same way as the larvæ of *Trypeta* do, tunnelling in every direction, especially through the superficial part of fruits, and disfiguring them. When an apple is attacked by these larvæ, this fact is manifest on the outside of the fruit by a dusky green track, somewhat depressed, over the tunnels.

Owing to a very wet season this year the insects were scarce, so that I could not obtain many specimens to rear, but I send you a single specimen of the cocoon, which may be of use for identification. I do not think that this insect is indigenous in Japan, but has probably been introduced from some foreign country. Formerly I thought that it must have been introduced from your country, until I was informed by Messrs. Howard and Fletcher that this was very unlikely. *Carpocapsa pomonella*, *Schizoneura lanigera*, *Mytilaspis pomorum*, *Coleophora malivorella*, and *Cacæsia rosaceana*, etc, have all been introduced here from America, and are all of them doing much damage to our horticulturists. I am not yet positive where the eggs are laid, but the first trace of entrance is always on the side, so I naturally assume that the place where the eggs are laid must be on the side. In Sapporo the earliest varieties of apple, such as Fameuse, Red Astrachan, etc., are more liable to be attacked, and the late varieties are less injured. The season during which fruit is liable to injury continues from June to November. I have often found the insect in stored apples even as late as the end of November.

The spraying of trees against this insect is not practised, but in autumn the ground under the affected trees is scratched and raked, so as to expose the cocoons to thawing and freezing. The cocoons are not very deep in the ground, at most about two or three inches. Last year I sent Dr. Howard a single specimen of the imago, and regret that I have not any other good duplicates on hand, but I will send you some next spring if I am successful in rearing. Yours truly,

M. MATSUMURA, Asst. Prof. of Entomology.

To E. A. Carew-Gibson, Victoria, B. C.

Mailed May 3rd, 1899.