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POPILIA JAPONICA NEWM., A RECENTLY INTRODUCED JAPANESE PEST.

BY EDGAR L. DICKERSON AND HARRY B. WEISS, NEW BRUNSWICK, N.J.

While inspecting a nursery in Southern New Jersey during the middle of August, 1916, the attention of the writers was attracted by a scarabæid feeding on the tips of *Cratægus*. Specimens were collected, and inasmuch as it was assumed to be a southern species, no particular attention was paid to it at that time. Recognizing, however, that it was new to New Jersey, specimens were recently sent to Mr. H. S. Barber and identified by him as *Popilia japonica* Newm. Mr. Barber stated that our specimens seemed to agree satisfactorily, even in the female genitalia, with the series of Japanese specimens in the collection of the United States National Museum. He also stated that this was the first record of the genus from America, and further that species in allied genera have caused considerable trouble in the Old World and when introduced into various of the Pacific Islands.

On July 31, soon after receiving this information, the nursery was visited and the beetles found to be present. They were especially abundant on weeds in one corner of the nursery, and to a lesser extent on adjoining nursery stock. On August 8, 1917, the nursery was again visited for the purpose of determining the exact status of the insect. At this time a considerable area was scouted and the following conditions observed. The beetles were found to be extremely abundant on weeds growing along one side of the nursery and extending at one point for a few feet into an adjoining orchard and along one side of the orchard away from the nursery and for a couple of hundred yards beyond. The infested area was small but the beetles numerous, and the line of spread appeared to have followed the weeds. At several places the insects were found on nursery stock, in most cases not far from the heavily infested weeds.

The feeding appears to be somewhat like that of the rose chafer and other scarabæids, but the destruction of the foliage is much more complete. Smartweed (*Polygonum virginianum*), tear-thumb (*Tiniaria arifolium*) both belonging to the *Polygonaceæ*, evening primrose (*Oenothera biennis*), Virginia creeper (*Ampelopsis quinquefolia*), a member of the *Vitaceæ*, were the principal food plants among the weeds, and in some cases the leaves of these plants were completely riddled. Other weeds infested to a less extent were ragweed (*Ambrosia* sp.), velvet leaf or Indian mallow

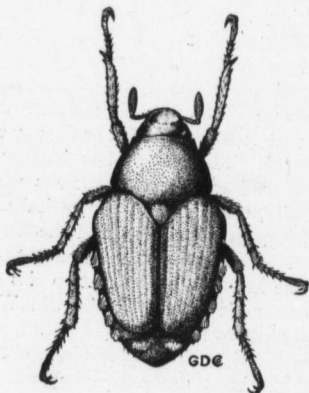


Fig. 9.—*Popilia japonica* Newm.

(*Abutilon avicennæ*), jewel weed (*Impatiens* sp.) and the blossoms of milkweed (*Asclepias syriaca*). In the nursery the beetles were found feeding on the foliage of *Ampelopsis quinquefolia*, flowering cherry, grape, elder, Crataegus, button bush, and in or on the flowers of double Althea, Spirea and *Vitex agnus-castus*. They were especially abundant on the foliage of the first three plants, and sometimes four or five were found buried in the double Althea flowers. On the smartweed as many as a dozen were found on single leaves. It was interesting to note that in the nursery, the beetles had apparently passed over the flowers and foliage of hydrangia and the foliage of Deutzia, peony and some other

plants and infested *Althea* blossoms and *Ampelopsis* foliage further away. Alfalfa, corn, tomatoes, pears in adjoining fields and cowpeas and pole beans in the nursery were uninfested, although the beans were close to the infested weeds. Smartweed in the midst of the cowpeas and tomatoes was badly eaten. The insects were found occasionally resting on other plants such as *Tamarix africana* in the nursery and corn silk in the field, but no feeding could be detected.

When disturbed during the heat of the day, the beetles would partly fall and fly off in a clumsy manner with a slight buzzing sound. On the whole they were quite active. Late in the day they were less active and would fall to the ground when disturbed. A number were noted in the attitude of copulation, but very few were found in copulo.

Mr. C. H. Uchida was kind enough to translate accounts of this insect as given in two Japanese text books. The first one is that given by S. Matsumura in his "Japanese Insect Pests," part 2, p. 247. He states that the beetles do considerable damage to string beans, grapes and certain wild beans; that the adults emerge in June and remain until September; that they are attracted by lights and controlled by hand picking and spring and fall plowing. The other account is that given by A. Fukatani in "Practical Methods of Destroying Insects on Horticultural Plants," p. 325. Mr. Fukatani gives the following account: The species feeds on string beans, peas, grapes and peanuts, the larvæ being found in the soil on the roots. The eggs are milky white, elliptical and about one-sixteenth of an inch in length. The larva is a characteristic white grub about three-fourths of an inch long, milky white, with a yellowish brown head. The pupa is about one-half inch in length, yellowish, covered with short hairs. The larva winters in the soil and pupates in May or June, the beetles emerging in July. Eggs are deposited singly in the soil and the larvæ moult several times before winter, the complete life cycle requiring one year. He also states that control is effected by jarring the beetles off the plants into a dish of oil and water; by jarring them from trees to a cloth spread below; by spraying with Paris green, lime and water; Paris green and Bordeaux mixture and by the use of Vaporite

in the soil, also that the use of organic manure and especially compost should be avoided.

From these two accounts it is evident that *Popilia japonica* is regarded as a pest in Japan. It was probably introduced into New Jersey in the larval stage in the soil around iris roots imported from that country. Japanese iris roots were first planted in the nursery where the infestation occurred about six years ago, and there have been two or three plantings of similar stock since that time. Azaleas imported from Japan have also been planted in this block but not previous to two years ago. Judging from the number of beetles observed, the insects must have been present more than two years. That it was not noticed sooner is due to the fact that its feeding is largely confined to weeds as has been stated. Its rate of dispersal is apparently very slow, as at the present time its feeding in the nursery is confined largely to that part where it apparently originated, and in the weeds outside of the nursery along the road it has not extended more than a few hundred yards. The fact that its rate of dispersal is slow is fortunate since if it became widely distributed it might become a serious pest on plants of the family *Polygonaceæ* such as buckwheat, and of the family *Vitaceæ*, such as grapes and perhaps on plants of other families such as cherry, etc.

While the Japanese account states that this insect infests leguminous plants, it is interesting to note that these plants remained uninfested although other plants in their midst were badly eaten, as has been mentioned above. The infestation in New Jersey is under careful observation: infested weeds and nursery plants are being treated with arsenic supplemented by hand picking. In this connection, it is interesting to note that where *Ampelopsis* was sprayed with arsenate of lead, the plants were practically free from the beetles, although previous to the spraying they were badly infested. No dead beetles were observed on the ground under the sprayed plants, but after careful observation it was found that some of both sexes had burrowed several inches into the soil under the infested plants. These beetles were very sluggish and had apparently been affected by the poison.

The beetle can be recognized from the following brief description: It measures a little less than one-half inch in length

and is similar in shape to species of *Euphoria*. The body and legs are metallic, bronze green in colour, save for the elytra which are reddish brown with dark margins. The lateral margins of the abdomen bear single tufts of conspicuous yellowish white hairs on each segment and a pair of these tufts on the exposed dorsal surface of the last segment. Each tuft extends downward forming a transverse line on the ventral surface, which becomes obsolete in the central portion. The ventral surface of the thorax and the basal segments of the legs are conspicuously hairy.

NOTES ON COCCIDÆ (HEMIPTERA).

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

It is the belief of the present author that more may now be accomplished by the redescription of many of our named species of Coccidæ than by the addition of new forms. Especially is it desirable that the types of many of the non-Diaspine genera be elucidated for the existing descriptions are, in certain cases, so inadequate that only the most vague and unsatisfying conception can be formed from them of the real character of the genera which they typify. Nor will the mere redescription of these forms in terms of the methods heretofore so generally employed by certain authors be sufficient. There must be an accompanying search for characters of real significance. Confidence in the all-sufficiency of the number of antennal segments and the character of the secretions as taxonomic criteria can no longer be maintained.

The present paper, therefore, is the first of a proposed series in which redescriptions of and notes upon the more interesting and more significant species available for study will be presented. Throughout these papers no references other than to the Fernald Catalogue and its supplements will be given, except in the case of some which may not be found therein.

Genus CRYPTOKERMES Hempel.

1903. Fernald, Catalogue of the Coccidæ, p. 88.

Monophleboid Coccidæ in which the adult female is entirely without legs or antennæ (and possibly without mouth-parts), remaining enclosed within the derm of the penultimate stage; penult-

imate stage with an anal tube which is formed by the chitinization of the posterior portion of the anal ring and not by the invagination of the posterior portion of the abdomen, with short, stout legs and antennæ and with mouth-parts; first larval stage in general resembling the first stage of *Icerya*, with slender, six-segmented antennæ, a well-developed anal tube, and with a series of long, slender setæ along the posterior margin of the body; all stages with six pairs of abdominal spiracles.

Type of the genus, *Cryptokermes brasiliensis* Hempel.

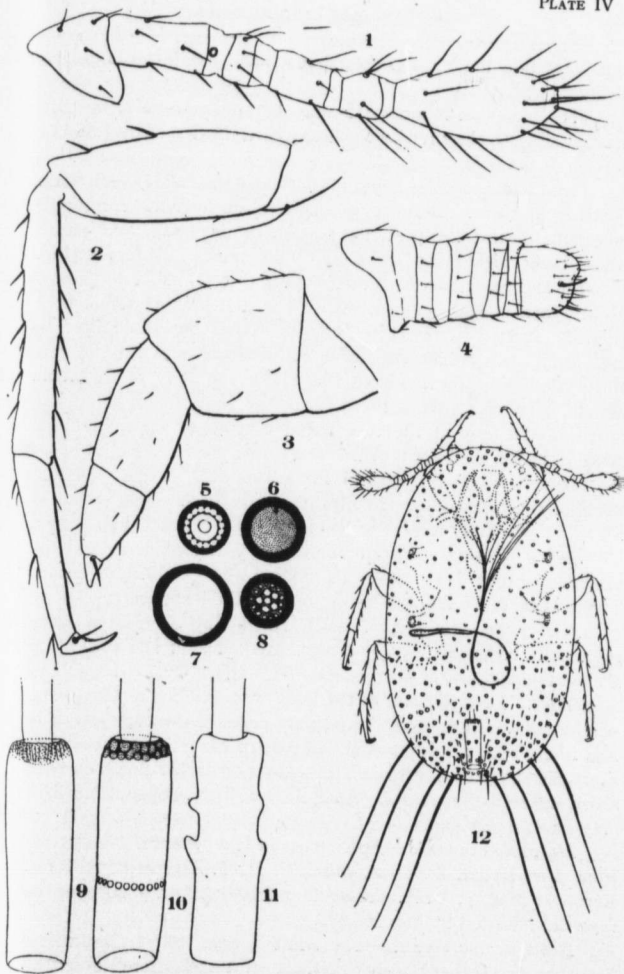
Notes on the genus.—In the Fernald Catalogue this genus is referred to the subfamily Dactylopiinæ, and is placed between *Ourococcus* and *Sphaerococcus*, apparently because of Cockerell's statement (1902) that "It is now clear that the genus is related to the Australian *Sphaerococcus* and *Ourococcus*." The real nature of the genera mentioned cannot well be determined from the existing descriptions, but it is fairly evident that *Cryptokermes* is related to neither of them. It is, in fact, unmistakably a Monophleboïd form, the presence of the abdominal spiracles alone being sufficient evidence of this. I may say that in this opinion Mr. E. E. Green concurs.

The exact affinities of the genus are somewhat in doubt. The first stage larva is distinctly *Icerya*-like, while the intermediate stages are very similar to *Xylococcus* except for the presence of the short legs and antennæ. The absence of legs and antennæ in the adult female is unique in this group, although by no means uncommon in the Coccidæ.

***Cryptokermes brasiliensis* Hempel.**

1903. Fernald, Catalogue of the Coccidæ, p. 88.

Adult female.—Length (flattened on slide) 5 mm. Derm membranous except for a large area of the dorsum (and possibly a portion of the venter) at the anterior end of the body, which is heavily chitinized. The eyes appear as two light spots in this chitinized area, which is thickly beset with short, spike-like spines. Remainder of the body sparingly beset with short, slender setæ, except about the vaginal orifice where the setæ are longer and more numerous. Dermal pores of the types shown in Fig. 5. The anal tube of the penultimate stage (in my specimens at least)



CRYPTOKERMES BRASILIENSIS Hempel.
(See p. 225.)

remains within the body of the adult female. Spiracles large and distinct.

The absence of mouth-parts may be apparent only, as they may possibly be obscured by the heavy chitinization of the anterior portion of the body.

Penultimate stage.—Length (flattened on slide) 4.5 mm. Globose in form. Derm everywhere quite heavily chitinized, especially toward the posterior portion of the body, and everywhere beset with many short, spike-like spines. Antennæ (Fig. 4) short and stout, six-segmented. Legs (Fig. 3) short and stout. Mouth-parts well developed, with a mentum present. Anal tube (Fig. 11) very heavily chitinized, its details not discernible in my specimens. In the specimens at hand the anal tube of this stage remains at the final ecdysis within the body of the adult female, a circular area of the derm of the penultimate stage surrounding the base of the tube remains attached to it, breaking away from the shed derm of this stage, and thus leaving an opening through which the eggs or larvæ probably escape. Dermal pores of the types shown in Figs. 6, 7 and 8, the type shown in Fig. 7 being merely a more or less irregular chitinized ring.

Second (?) stage.—Except for the unchitinized derm and the presence of but few spines, resembling the penultimate stage. The anal tube (Fig. 10) chitinized only at the inner end.

First stage.—In general much resembling an *Icerya* larva (Fig. 12). Antennæ (Fig. 1) 5-segmented, slender and presenting a clavate appearance, bearing numerous short hairs. Legs (Fig. 2) slender. Posterior end of the body with a series of eight long, slender setæ. Derm beset with many pores of the type shown in Fig. 6 and with a few pores of the type of Fig. 8, also with many short, slender setæ and toward the posterior end of the body with short, tubercle-like spines. Anal tube well developed, chitinized only at the inner end.

Material examined.—Specimens in the Stanford collection from *Mimosa* sp., Zapotlan, Mex., C. H. T. Townsend collector. Received from T. D. A. Cockerell and evidently a portion of the material recorded by him in 1902.

Notes on the species.—The adult female has not heretofore been described, that which both Hempel and Cockerell described

as this stage being in reality the penultimate stage. The form described by Cockerell as the first stage larva of this species is probably either incorrectly described or does not belong with this species, for he speaks of the presence of "figure-of-eight" pores and of projecting anal lobes. The form described by him as the second stage is what I here consider to be the first stage.

EXPLANATION OF PLATE IV.

Cryptokermes brasiliensis Hempel.

- Fig. 1. Antenna of first stage larva.
 Fig. 2. Leg of first stage larva.
 Fig. 3. Leg of penultimate stage.
 Fig. 4. Antenna of penultimate stage.
 Fig. 5. Dermal pore of adult female.
 Fig. 6. Dermal pore of first stage and succeeding larval stages.
 Fig. 7. Dermal pore of second (?) and penultimate stages.
 Fig. 8. Dermal pore of larval stages.
 Fig. 9. Anal tube of first stage larva.
 Fig. 10. Anal tube of second (?) stage larva.
 Fig. 11. Anal tube of penultimate stage.
 Fig. 12. First stage larva.
- Note.*—Antennæ and legs only drawn to uniform scale.

THE HEATH COLLECTION OF LEPIDOPTERA.

(Continued from Vol. XLIX, p. 92.)

BY J. B. WALLIS, WINNIPEG, MAN.

The Geometridæ were, in cases of doubt, submitted to Mr. A. F. Winn or to Drs. Barnes and McDunnough.

In all the following species it was considered advisable to give the changes as indicated by the new check list. But as it is improbable that the collection will be re-arranged for a considerable period; the order of the species in the collection, that is, of the Smith list, is adhered to. The names in brackets are those given in Drs. Barnes and McDunnough's list.

Geometridæ.

- 3504 *Nyctobia nigroangulata* Strck.
 3508 *Rachela bruceata* Hulst. Rare in Manitoba.

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- 3513 *Paleacrita vernata* Peck.
 3515 *Alsophila pometaria* Harr. Rare in Manitoba.
 3516 *Eudule mendica* Wlk.
 3524 *Tallega (Lobophora) tabulata* Hulst.
 3545 *Tephroclystis (Eupithecia) ornata* Hulst.
 3546 " " *miserulata* Grt.
 3563 " " *absinthiata* Clerck. Not North
 American according to the new list.
 3591 *Tephroclystis (Eupithecia) ravocostaliata* Pack.
 3595 *Eucymatoge (Eupithecia) anticaria* Wlk.
 3599 " (*Horisme*) *intestinata* Guen. A badly worn
 specimen of this stood as "*vitalbata*."
 3604 *Euchoeca (Trichodesia) albovittata* Guen.
 3606 " (*Eupithecia*) *cretacea* Pack.
 3608a " (*Hydrelia*) *brunneifasciata* Pack.
 3612 *Hydria (Calocalpe) undulata* Linn.
 3620 *Eustroma (Lygris) diversilineata* Hbn.
 3621 " " *testata* Linn. Stood as "*populata*."
 3622 " " *propulsata* Wlk. Stood as "*testata*."
 3623 " " *destinata* Moeschl. var.
 3624 " " *triangulata* Pack. Stood as "*destinata*."
 3628 " " *cunigerata* Wlk.
 3631 *Rheumaptera (Eulype) hastata* Linn.
 3632 " (*Epirrhoe*) *tristata* Linn.
 3633 " " *sociata* Bork. (*alternata* Mull.)
 3642 *Percnoptilota (Orthonama) fluviata* Hbn. (*obstipata* Fab.)
 3643 *Mesoleuca ruficillata* Gn.
 3646 " (*Xanthorhoe*) *lacustrata* Gn.
 3648 " (*Euphyia*) *intermediata* Gn. Stood in part as
Cymatophora flavicaria and what are apparently badly
 worn specimens of this as *Xanthorhoe montanata*.
 3651 *Mesoleuca (Dysstroma) truncata* Hufn.
 3655 " " *hersiliata* Gn.
 3659b *Hydriomena nubilosfasciata* Pack.
 3660 " *autumnalis* Strom. (*caerulea* Fab.)
 This and the preceding stood as *Mesoleuca hersiliata*.
Hydriomena ruberata Frey.
 3663 " *californiata* Pack.

- 3665 *Hydriomena reflata* Grt.
 3673 " (*Euphyia*) *multiferata* Wlk.
 3674 " (*Euphyia*) *latirupta* Wlk (*centrostrigaria* Woll.)
 Stood as *Xanthorh e ferrugata* and *munitata*.
 3689 *Triphosa h esitata* Gn. Correctly and also as *dubitata*.
 3710 *Gypsochroa* (*Xanthorh e*) *designata* Hufn.
 3731 *Xanthorh e munitata* Hbn.
 3732 " *ferrugata* Clerck. Stood as *munitata*.
 3743 *H emotopis grataria* Fab.
 3751 *Mycterophora slossoni e* Hulst. (*inexplicata* Wlk.)
 3752 *Deptalia insularia* Gn. (*Pleuroprucha insulsaria* Gn.)
 3755 *Cosymbia lumenaria* Hbn.
 3762 *Synelys enucleata* Gn. (*Ocidalia enucleata* Gn.)
 3769 *Xystrota hepaticaria* Gn.
 3772 *Cinglis similaria* Wlk. ("Probably" McD.) (*Cabera erythemaria*.)
 3773 *Cinglis* (*Acidalia*) *purata* Gn.
 3775 " " *ancellata* Hulst. "Apparently" McD.
 3786 *Leptomeris* (*Holarctias*) *sentinaria* Geyer. Stood as *magnetaria*.
 3820 *Eois persimilis* Hlst. (*Acidalia junctaria* Wlk.).
 3821 " (*Ptychopoda*) *inductata* Gn.
 3834 *Annemoria* (*Cheteoxelis*) *bistriaria* Pack.
 3841 *Nemoria* (*Chlorissa*) *subcroceata* Wlk.
 3845 *Eucrostis* (*Mesothea*) *incertata* Wlk. In the series with the preceding.
 3857 *Synchlora denticularia* Wlk. Stood as *liquoraria*.
 3864 *Chlorosea* (*Memoria*) *mimosaria* Gn.
 3881 *Epelis faxonii* Minot. (*Isturgia amitaria* Gn.).
 3882 *Eufidonia notataria* Wlk.
 3883 *Orthofidonia exornata* Wlk. (*tinctaria* Wlk.).
 3884 " (*Bapta*) *semiclarata* Wlk.
 3885 " " *vestaliata* Gn.
 3896 *Gueneria basiaria* Wlk. Stood as *Deilinea erythemaria*.
 3897 *Deilinea* (*Cobera*) *borealis* Hulst.
 3900 " " *variolaria* Gn.
 3926 *Sciagraphia* (*Macaria*) *granitata* Gn.
 3927 " " *denticulata* Grt.

- 3940 *Sciagraphia (Phasiane) meadiaria* Pack. Stood as *continuata*.
 3943 " *(Phasiane) mellistrigata* Grt.
 3946 *Philobia enotata* Gn. (*æmulataria* Wlk.).
 Macaria (Phasiane) ordinata Wlk.
 3969 *Cymatophora (Itame) ribearia* Fitch.
 3970 " " *sulphurea* Pack.
 3971 " " *occiduaria* Pack.
 3989 " " *pustularia* Hbn.
 4015 " " *inquinaria* Hulst. (*quadrilinearia*
 Pack.).
 4027 *Sympherta julia* Hulst (*Dysmigia loricaria* Evers).
 4068 *Alcis (Hesperumia) sulphuraria* Pack.
 4608a " " *baltearia* Hulst.
 4090 *Paraphia subatomaria* Wood.
 4138 *Cleora indicataria* Wlk.
 4140 " *pampinaria* Gn.
 4145 " *larvaria* Gn.
 " *takenaria* Pears. (*ephyraria* Wlk.).
 4148 *Melanolophia canadaria* Gn.
 4153 *Ectropis crepuscularia* Schiff. Stood as *Cleora inductaria*
 and *Sabulodes umbrosarium*.
 4156 *Lycia ursaria* Wlk.
 4158 " (*Amphidasis*) *cognataria* Gn.
 4164 *Nacophora quernaria* S. & A.
 4175 *Erannis tiliaria* Harris.
 4177 *Cingilia catenaria* Dru.
 4182 *Dyscia orciferata* Wlk. (*Aspilates orciferaria*).
 4189a *Anagoga occiduaria* Wlk.
 4193 *Sicya macularia* Harr.
 4202 *Therina (Ellopia) fiscellaria* Gn.
 4206 *Metrocampa prægrandaria* Gn. (*Campæa perlata* Gn.).
 4209 *Eugonobapta nivosaria* Gn.
 4216 *Ennomos magnarius* Gn.
 4218 *Xanthotype crocotaria* Fab.
 4218a " *cælaria* Hulst.
 4224 *Plagodis phlogosaria* Gn. probably.
 4227 *Hyperetis amicaria* H. S.
 4232 *Ania limbaria* Haw. (*Nematocampa limbata* Haw.).

- 4236 *Gonodontis duaria* Gn. Stood in part as *warneri*.
 4247 *Euchlæna obtusaria* Hbn.
 4248 " *effectaria* Wlk. (*effecta* Wlk.). Mixed with
obtusaria.
 4251 *Euchlæna johnsonaria* Fitch.
 4254 " *astylusaria* Wlk. Probably. This was under
marginata and *amoenaria*.
 4255 *Euchlæna marginata* Minot. Mixed with *pectinaria*.
 4256 " *pectinaria* D. & S.
 4261 *Eutrapela (Selenia) alciphearia* Wlk.
 4272 *Metanema inatomaria* Gn.
 4273 " *determinata* Wlk.
 4281 *Priocycla armataria* H. & S.
 4292 *Azelina ancetaria* Hbn. (*Pero honestarius* Wlk.).
 4299 *Caberodes (Apicia) confusaria* Hbn.
 4300 " " *majoraria* Gn. = *confusaria*, according to
 the new list.
 4304 *Tetracis crocallata* Gn.
 4307 *Sabulodes arcasaria* Wlk.
 4309 " *lorata* Grt.
 4319 " *transversata* Dru.
 4321 *Abbotana clemataria* S. & A.
 4330 *Brephos infans* Moeschl. One only.
 4333 *Leucobrephos brephoides* Wlk.

Epiplemidæ.

- 4336
- Callizzia-amorata*
- Pack.

(To be continued.)

NEW SPECIES OF MICROLEPIDOPTERA.

BY ANNETTE F. BRAUN, CINCINNATI, OHIO.

HELIODINIDÆ.

***Erineda aenea*, n. sp.**

Palpi and face pale buff, head yellowish, slightly purplish opalescent or brownish in the female. Basal segment of antennæ yellowish, stalk clothed with dark brown scales, except the last six or seven segments which are white. Antennæ of male with long, sparse ciliation in the basal half, with short cilia in the apical half. Thorax purplish opalescent. Fore wings dark golden brassy,

becoming darker towards apex. A velvety dark brown spot at base of costa is surrounded by opalescent purple, which gradually fades into the ground colour. The purplish opalescence is less noticeable in the female. Hind wings brownish brassy. Hind tibiae bright yellow, with upper edge and spines orange-tinged, apex black; hind tarsi blackish above, whorls of spines yellowish. Abdomen concolorous with hind wings at base, dark brown toward tip, anal tuft in male yellowish.

Expanse 8-9 mm.

Localities.—Cincinnati, O.; Clermont Co., O.

Type and two paratypes in author's collection.

This species may be distinguished from *E. elyella* Busck by the larger basal brown spot, much darker colour, with absence of dorsal light streak, and by the different antennal coloration and structure.

The larvæ feed on the spores of two species of ferns, the narrow-leaved spleenwort (*Asplenium angustifolium*) and the silvery spleenwort (*A. acrostichoides*). A web, beneath which the larva feeds, is spun along the underside of the leaflet, often extending for three-fourths its length by the time the larva reaches maturity. When young the larva mines into the sorus, eating out the greater portion of the spores and leaving the indusium hollow. Later the larva becomes too large to mine and consumes the entire sorus, except the annuli of the sporangia, in many places leaving only the ridge along which the indusium was fastened to the leaf, indicating perhaps that this is also consumed in addition to the spores. Near the beginning of the web, and to one side of the midrib, a circular opening leads to the upper side. Protecting the opening on the upper side, and broadest and thickest just over the opening, is a tubular web tapering and crossing the midrib diagonally. It is somewhat raised at the beginning, but flattens toward its narrow end, where there is an opening through which the larva ejects the frass. On the underside of the leaf, the web is also thickest over the circular hole. The web is decorated with the innumerable rejected annuli of the sporangia, which cover closely those portions around the circular opening, both on the upper and under surfaces of the leaf, thus affording protection to the larva when not feeding. The larva while feeding is yellowish

white with slightly darker head and prothoracic shield; at maturity it turns to a bright vermilion orange colour. It spins a double cocoon of very fine, white silk, broadly oval, with one end a little more pointed, the inner cocoon more elongate than the outer.

The larvæ may be found in September; the exact time of reaching maturity depends upon the time of spore production in the ferns. *Asplenium acrostichoides* produces fertile fronds and ripe spores a couple of weeks in advance of *A. angustifolium*. Where both species of ferns occur together, full-grown larvæ may be collected on the former species when the larvæ on the latter have eaten but one or two sori on each side of the midrib. The imagos emerge during the latter part of July and early August.

In repose the moth rests with the brightly coloured hind legs raised above the body.

YPONOMEUTIDÆ.

Argyresthia pallidella, n. sp.

Palpi pale yellowish white, fuscous beneath. Face and head yellowish white, tuft almost white, antennæ grayish yellow, annulate with dark brown. Thorax and fore wings pale shining yellowish white; extreme costa in the basal fourth dark brown. Cilia whitish. Hind wings very pale gray or concolorous with the fore wings, cilia whitish. Legs whitish, tibiæ and tarsi of the first pair fuscous. Abdomen brownish yellow at base, gray behind except tip, which is whitish yellow.

Expanse 11 mm.

Locality.—San Bernardino Mts., California, July 7.

Type and paratype in author's collection.

The specimens were collected amongst fir, which is perhaps the food plant. This species is very similar to *A. laricella* Kearf., the chief difference being the darker annulated antennæ.

Swammerdamia cuprescens, n. sp.

Head and face white; palpi white with fuscous under surface; basal segment of antenna white, stalk dark fuscous, annulate with pale gray. Thorax white, very sparsely sprinkled with pale gray specks. General colour of the fore wing pale gray, due to gray-tipped whitish scales, with the base of the wing somewhat darker gray. There is a dark gray half-crescent-shaped mark situated at the basal third of the dorsum, curving slightly outwards and

not reaching the costa. There are some longitudinal series of dark fuscous spots lying chiefly near the costa and dorsum. At the beginning of the cilia is a white costal spot; beyond it the apical portion of the wing is dark fuscous, the fuscous shade usually extending downward to the dorsum. Cilia dark with a coppery lustre and a dark fuscous line through the middle. Hind wings pale gray, closely irrorated with fuscous. Legs pale gray; tibiae and tarsi of the first pair and tibiae of the second pair dark fuscous; tarsal segments tipped with fuscous. Abdomen gray.

Expanse 12.5-13.5 mm.

Locality.—Field, B.C.

Type and two paratypes in author's collection; one paratype in the collection of the Entomological Branch, Department of Agriculture, Ottawa.

Four specimens bred from larvæ in webs on birch (*Betula glandulosa*), Field, B.C. Larvæ were also collected on alder at Glacier, B.C., but no moths were reared. Larvæ collected in August, pupated in a few days, and the moths appeared in the breeding jars in April and May of the following year.

This species differs from the European *S. heroldella*, also a birch feeder, by the distinct coppery lustre of the cilia.

***Xyrosaris ochroplagiata*, n. sp.**

Palpi white with under surface irrorated with blackish, except towards apex. Face dusted; head pure white; antennæ white with fuscous annulations. Thorax white slightly dusted. Base of wings irrorated with fuscous-tipped scales, blackish toward costa; beyond this is a pale ochreous, almost undusted area, extending obliquely from costa to dorsum, and broadening toward the dorsum, occupying approximately one-fourth the wing area; remainder of the wing covered with more or less deeply fuscous-tipped white scales, mingled with patches of whitish and ochreous. Immediately following the basal ochreous area, near middle of dorsum is a small, curved, white streak, margined outwardly with a patch of scales, darker tipped than general over the wing. A similar dark patch on costa opposite. A white costal spot at beginning of cilia. Several rows of very minute tufts of black scales; immediately below costa, along middle of wing, just above fold, and one or two of a fourth row below fold on outer half of wing; the largest tufts

are those at the basal third and above the tornus belonging to the row above the fold. Cilia ochreous, with a line of dark-tipped scales. Hind wings gray, with a faint ochreous tinge; cilia gray, ochreous at extreme bases. Fore and middle legs closely irrorated with fuscous, hind legs sparsely speckled. Abdomen gray, margins of segments whitish.

Expanse 11.5 mm.

Locality.—Winnfield, La., June 26 (G. R. Pilate).

Type in author's collection.

GRACILARIIDÆ.

Acrocercops affinis, n. sp.

Palpi with whitish ground colour more or less obscured with fuscous dusting; second segment of labial palpus white on the under surface, elsewhere fuscous; third segment with the base white followed by a narrow, blackish annulus which is succeeded by a narrow whitish annulus, remainder of segment fuscous. Antennæ fuscous faintly paler annulated. Head whitish more or less densely streaked with fuscous. Fore wings brownish fuscous, dusted, marked with a series of ten transverse whitish strigulæ, the first eight equidistant, the last two in the apical cilia; these strigulæ are most distinct on the costa, obsolete or ill-defined where they cross the middle of the wing, and ending in whitish spots on the dorsum. The first streak is usually nearly obsolete; the fourth ends in a whitish blotch on the dorsum; the seventh is more oblique and more clearly defined in the middle of the wing than the preceding ones; the eighth encloses the apex. The fifth streak on the costa is sometimes double. The ground colour is more or less darkened on the margins between the streaks, especially between the fourth and fifth, and sixth and seventh costal streaks; and between the second and third, and fourth and fifth dorsal streaks. Hind wings and cilia gray. Legs whitish banded with fuscous. Abdomen gray.

Expanse 9.5–10 mm.

Localities.—Yosemite National Park, California; San Bernardino Mts., California.

Types in author's collection.

A large series bred from upper side blotch mines on oak, both deciduous and evergreen. The mine starts as a narrow, white

line, expanding abruptly into a large, white blotch, within which the parenchyma is to a large extent consumed. Cocoon oval, brownish, ornamented with a few whitish globules. Larvæ collected June 20 (San Bernardino Mts.); July 26 (Glacier Point, Yosemite), at which time they were nearly full grown, produced imagos in about two weeks.

Closely allied to *A. strigosa*, from which it differs by having the transverse lines broken and less distinct and a little more irregularly placed.

***Ornix spiraeifoliella*, n. sp.**

Palpi grayish white, face grayish white, tuft of gray and whitish scales intermixed, antennæ gray, faintly annulate. Thorax and fore wings uniform shining seal brown; a white line on each side of the thorax is continuous with a broad, white basal streak above the fold to one-fifth; base of dorsum narrowly and indistinctly white; from one-third of costa a very oblique costal streak narrowing below costa into faint line, then expanding in the middle of the wing, where it meets, almost at right angles, the apex of a less oblique streak from the middle of the dorsum. A second slightly oblique spot at the middle of costa; somewhat oblique narrow costal and dorsal streaks at two-thirds meeting in the middle of the wing; following them a pair of inwardly oblique streaks. A large triangular, white costal spot lying chiefly in the cilia just before apex, is more or less distinctly divided into two by a gray streak; opposite it a white spot in the terminal cilia; cilia elsewhere concolorous with wing; extreme apex of wing slightly darker than ground colour. Hind wings and cilia gray. Legs gray, banded with white.

Expanse 6.5 mm.

Locality.—Field, B.C.

Type in author's collection.

The larva mines the underside of leaves of *Spiræa* sp., making a much wrinkled mine in which the parenchyma is entirely consumed; in the breeding jar the larva on leaving the mine, folded the leaf inwards with upper surfaces together; later made a fold on to the underside in the usual way; cocoon in a folded edge of the leaf. Larva collected August 22; moth the following spring.

A very distinct species, belonging in the group of *guttea*, *kalmiella* and *preciosella*.

Gracilaria hypericella, n. sp.

Face whitish; palpi whitish, with the tip of the maxillary palpi and the tip of the second segment of the labial palpi and outer and upper surface, and sometimes the entire apical half of the third segment except the extreme tip, blackish. Head ochreous, more or less overlaid with fuscous purple. Ground colour of the fore wing ochreous, more or less overlaid with shining purplish fuscous; usually the costal third of the wing, except toward base and in the apical fourth, is comparatively free from purplish dusting. There is a series of minute fuscous dots on the costal edge; in darker specimens sometimes indistinctly continued across the wing. The dark scales form an indistinct spot in the middle of the disk. Cilia fuscous, with three or four indistinct, darker lines running through them. Hind wings and cilia gray. Fore and middle legs black, except the tarsi; hind legs whitish dusted with fuscous; tarsi white with black tips.

Expanse 8.5-10 mm.

Localities.—Cincinnati, O.; Clermont Co., O.

Types in author's collection.

Seventeen specimens, reared from larvæ on St. John's Wort, *Hypericum cistifolium*, and *H. punctatum*. The larva makes a small linear mine, usually distinctly visible on the upper side of the leaf; this mine enlarges into an elongate blotch on the underside, 7 or 8 mm. long and 2 mm. or less wide, which becomes tentiform, resembling a minute *Lithocolletis* mine. The cone is rolled from the tip of the leaf downward on to the lower side, usually taking up the entire small leaf. The cocoon is spun on the underside, the leaf being curled over so as entirely to conceal the cocoon. On leaves of *Hypericum cistifolium*, the cocoon is almost always placed near the tip over the midrib, and the leaf on both sides is curled over the cocoon. Larvæ and cocoons collected July 20 and August 27; one captured specimen July 8.

This species is close to *G. desmodiella*, but lacks the violet tint of that species and the discal spot is never distinct.

Gracilaria ferruginella, n. sp.

Labial palpi densely dusted with reddish fuscous outwardly, yellowish on inner side, with third segment slightly dusted except at extreme tip; third segment thickened with scales to near apex. Head and thorax purplish brown, slightly mixed with ochreous.

Antennæ purplish fuscous, annulate with ochreous. Fore wings purplish brown, somewhat mixed with ochreous; rarely the ochreous predominates. Beneath the fold irrorated with blackish fuscous; these blackish scales are aggregated into a large spot beneath the trigonal mark. Wing sprinkled with whitish or ochreous spots along the fold. An indistinctly outlined trigonal spot at one-third, is marked on the costa by a series of black spots, usually two larger followed by four small ones; between the trigonal spot and an elongate ochreous spot beyond, the ground colour deepens on the costa to blackish fuscous. The second spot is also marked on costa with blackish dots. Sometimes the trigonal marks are obliterated by fuscous purplish ground colour which then suffuses almost uniformly the entire wing. A few ochreous costal spots along margin from beginning of cilia; one at extreme apex; more conspicuous whitish spots along termen; sometimes irregularly placed whitish dots along dorsal margin. Cilia rust red, especially at their bases and along termen near tornus; conspicuously marked with a dark brown band which crosses in a broad curve from the tips of the costal cilia to the tips of the terminal cilia just beyond the tornus, almost touching the apex; tips also of the apical cilia dark brown. Hind wings and cilia gray. Fore and middle legs closely dusted with fuscous purple, tarsi white with black tips; hind legs gray. Abdomen gray.

Expanse 15 mm.

Localities.—Yosemite Valley, California; Mt. Tamalpais, Marin Co., California; San Bernardino Mts., California.

Types in author's collection.

Three specimens, from larvæ on Azalea, *Rhododendron occidentale*, from Yosemite, and a series of about twenty-five captured specimens.

The larva makes a tentiform mine on the under surface of the leaf, later rolling the leaf from tip down into a cone. The cocoon is whitish elongate. The larvæ were collected July 29, yielding moths about the middle of August; the captured specimens were taken July 9 to 30.

The markings of the cilia are the most distinguishing characteristic of this species. In some of its forms it approaches varieties of *G. alnivorella*, from which the markings in the cilia and thickened palpal segment will always separate it.

NOTES ON THE NORTH AND CENTRAL AMERICAN
SPECIES OF ACANTHOCEPHALA LAP.

(Fam. Coreidæ: Heteroptera.)

BY EDMUND H. GIBSON AND ABBY HOLDRIDGE, U. S. BUREAU
OF ENTOMOLOGY, WASHINGTON, D. C.

An exceptionally good and large series of specimens of the genus *Acanthocephala* Lap. in the collection of the U. S. National Museum has afforded the writers an opportunity for detailed study of this group, and has enabled them to untangle several of the perplexing questions in regard to the identity of species.

Acanthocephala is a neotropical genus and contains a rather long list of described species. However, it seems warranted to believe that with further study of South American material the number of species will be reduced as many will probably be forced into synonymy. Seven species are known to occur in Central America, five of which are also to be found in southern United States.

Previous workers have divided the genus into two subgenera, according to the variation in the form and shape of the thorax, but as this character exhibits great variability within a species and the form and the shape of the dilatation of the hind tibia is certainly of more value in separating the species and is constant within a species, the present authors feel justified in not recognizing the old subgeneric divisions and are even restrained from forming new ones.

Acanthocephala was described by Laporte in 1832, Ess. Hem., p. 29, and may be characterized as follows:

Head short, terminating in a spine as viewed from above. Antennæ long and slender, first joint stouter than the rest and slightly longer than the length of the head, fourth joint usually somewhat curved. Thorax wider than elytra. Membrane extending slightly beyond apex of abdomen. Posterior femora more or less swollen, sometimes greatly so and curved, armed with prominent spines.

Posterior tibia with dilatations on either side, the outer dilatation the widest and longest.

It is the largest and best known genus of the tribe *Acanthocephalini* Stal. The orthotype of the genus is *latipes* Drury:

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The following key to the species includes all those occurring in Central and North America.

KEY.

1. Thorax greatly expanded laterally beyond margin of abdomen and elytra. Thorax prominently concave.....*declivis* Say.
Thorax wider than abdomen but not greatly expanded, not prominently concave.....2
2. Dilatation of posterior tibia very small and limited to basal third. Inner margin of posterior tibia spinous in male. Femora of male greatly swollen.....*bicoloripes* Stal.
Dilatation of posterior tibia noticeably greater, inner margin of male comparatively smooth.....3
3. Outer dilatation of posterior tibia in both sexes very broad, widened at apex and broadly rounding.....*latipes* Drury.
Form of dilatation of posterior tibia not as above.....4
4. Outer dilatation of posterior tibia in both sexes broad to almost the very tip, but not widened at apex. Large species.....*granulosa* Dall.
Outer dilatation of posterior tibia not wide at or near the apex. If it extends to near the apex then much narrowed.....5
5. Species small. Dilatation of posterior tibia in both sexes extending but two-thirds or slightly more the entire length of tibia.....*terminalis* Dall.
Species large. Dilatation of posterior tibia extending distinctly more than two-thirds the length of tibia, sometimes to nearly the apex.....6
6. The outer dilatation of posterior tibia of male without distinct scallops. Hind femora of male usually greatly swollen and bowed. Female broad. Thorax prominently tuberculate.....*femorata* Fabr.
The outer dilatation of posterior tibia of male with distinct scallops. Hind femora straight and not as greatly swollen. Female comparatively more narrow. Thorax minutely tuberculated.....*confraterna* Uhl.

Acanthocephala bicoloripes Stal.

Metapodius bicoloripes Stal., Ofv. Vet. Ak. Forh. p. 184, 1855.

This species may easily be distinguished from all others by the small and extremely short dilatation of the posterior tibia which is limited to the basal third of the tibia. The apical two-thirds of the posterior tibia in the female is slender and slightly spinous along inner margin, while in the male it is gradually narrowing and distinctly and coarsely spinous. The hind femora of the male is greatly swollen and somewhat curved as in *femorata* Fabr. It is a distinctly smaller species than *femorata* Fabr.

It has been recorded from Costa Rica and Columbia. All specimens examined are from the first mentioned country.

Acanthocephala femorata Fabr.

Cimex femorata Fabricius, Syst. Ent., p. 708, 1775.

Rhinuchus nasula Say, New Harm. Indiana, p. 10, 1832.

Metapodius bispinus Westwood, in Hope Cat., II., p. 15, 1842.

Metapodius obscura Westwood, in Hope Cat., II., p. 15, 1842.

Metapodius luctuosa Stal., Æv. Vet. Ak. Forh., p. 184, 1855.

Of all the species this one shows the greatest variability, both in male and female. The variations are most notable in the general size of the bug and character of its posterior femora. The posterior femora of the male varies from one extreme in being very greatly swollen and prominently curved, to the other extreme of being only normally swollen and almost straight. Innumerable gradations between the two are to be found. The character of the dilatation of the posterior tibia is, however, stable.

This species has been recorded from all of the Southern States, and is also known to occur in Mexico and Central America.

Acanthocephala confraterna Uhl.

Metapodius confraterna Uhler, Proc. Bost. Soc. Nat. Hist., vol. XIV, p. 99, 1871.

In general this species most nearly resembles the preceding; especially is this so with the females. The character of the dilatation of the posterior tibia of the male is like that exhibited in *terminalis* Dall. The posterior femora of the male are more slender and not so curving as in *femorata* Fabr. The females are somewhat longer and narrower than in *femorata* Fabr. The species is noticeably larger than *terminalis* Dall.

The species examined are from Florida and Texas.

Acanthocephala terminalis Dall.

Metapodius terminalis Dallas, List of Hem., II, p. 432, 1852.

Metapodius instabilis Uhler, Proc. Bost. Soc. Nat. Hist., vol. XIV, p. 98, 1871.

This is the smallest species of the genus and is the most constant in its characters. Normally it is very dark, almost black. The posterior femora in the male is only slightly larger than in the female.

The authors are unable to separate Uhler's *instabilis* from this species, and feel warranted in placing it in synonymy with *terminalis* Dall.

Specimens in the National Museum collection record its distribution from New York west through Illinois and Missouri and south to Texas.

Acanthocephala granulosa Dall.

Metapodius granulosa Dallas, List Hem., II, p. 430, 1852.

Diactor alata Herr.-Sch., Wanz. Ins., VI, p. 53, 1842.

Metapodius thomasi Uhler, Hayden's Surv. Mont., p. 339, 1872.

The wide dilatation of the posterior tibia which extends to the apex is characteristic of this and the following species. In *latipes* Drury, however, the dilatation is widened and broadly rounded at the apex, while in this species it is slightly and gradually narrowed. Typical specimens have their elytra of a distinct mahogany brown. The long, bright orange fourth antennal segment with the bright orange tibia of the first two pairs of legs are also characteristic. It is a large species and is known to occur in Arizona, New Mexico and Texas, as well as throughout Central America.

Acanthocephala latipes Drury.

Cimex latipes Drury, Ill. Nat. Hist., III, p. 62, 1782.

Lygaeus compressipes Fabr., Syst. Rhyng., p. 209, 1803.

Acanthocephala albicollis Dall., List, III, p. 427, 1852.

The characters as mentioned in the key to the species will suffice to distinguish this species. It might also be remarked that the fourth antennal joint is extremely long, and the posterior-lateral angles of the thorax terminate in almost a spine.

Specimens are at hand from Panama and Costa Rica.

Acanthocephala declivis Say.

Acanthocephala declivis Say, New Harm. Ind., 1832.

Diactor alata Burm., Handb., II, I, p. 334, 1835.

Metapodius thoracicus Dall., List, II, p. 428, 1852.

Acanthocephala subalata Distant, Biol. Cent. Amer., p. 119, 1881.

The extremely wide and concave thorax readily separates this species, although the shape of the posterior lateral angles varies a great deal. These are broadly rounding in some specimens, in others acutely pointed, with every intergradation to be found. The form of the dilatation of the posterior tibia places it with *latipes* Drury and *granulosa* Dall. The general size varies from specimens as small as *terminalis* Dall. to those larger than *granulosa* Dall.

The species is known to occur throughout Central America and north into southern United States.

THE BLACK CHERRY APHIS, *MYZUS CERASI*.

On page 434 of the Canadian Entomologist for 1917, Mr. W. A. Ross calls attention to the fact that in my paper before the California State Fruit Growers' Convention in 1914, the black cherry aphid was referred to as a species not having alternate food habits. Since that date we have recorded this species a few times in small numbers upon water cress, collected by L. B. Bragg. However, our observations and records indicate that this aphid continues throughout the year upon the cherry in Colorado, and we have never found it abundant upon the alternate host.

No one in the department recalls seeing this species upon the sweet cherries—Royal Ann, Bing, Black Tartarin, Black Republican, etc., and we can recall but very few cases where it has been seen in any abundance upon the semi-acid cherries, the Dukes, but it is a common and, often, abundant louse upon the sour red cherries, English Morello, Montmorency wragg and their like, on the eastern slope of the mountains. It yields readily to the application of the contact insecticides as the leaves do not curl enough to give protection to the lice.

C. P. GILLETTE.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ,
DIPTERA) PART V.BY CHARLES P. ALEXANDER, UNIVERSITY OF KANSAS,
LAWRENCE, KAS.

(Continued from page 165.)

Genus *Tricyphona* Zetterstedt.***Tricyphona protea***, new species.

General coloration pale yellowish brown; wings with the free portion of vein R_2 very long, only a little shorter than the sector; cell R_4 short-petiolate; cell 1st M_2 open by the atrophy of m .

Male.—Length 6.4 mm.; wing, 6.5 mm.

Described from an alcoholic specimen.

Rostrum and palpi pale; palpal segments nearly subequal, the fourth a little longer than the third and more slender. Antennæ dark brown, the basal segments paler; flagellar segments oval, the terminal segment not elongated. Head yellowish, darkest on the vertex.

Thorax light yellowish brown without apparent darker stripes. Halteres short, pale, the knobs large. Legs with the coxæ and trochanters dull yellow; remainder of the legs broken. Wings a pale yellowish tinge; veins yellowish brown. Venation: Sc_1 ending just before the fork of R_{2+3} ; Sc_2 some distance before the origin of the sector, this distance about equal to the basal deflection of Cu_1 ; vein R_2 fused with R_1 for a short distance back from the wing-margin, this fused portion about equal to $r-m$; petiola of cell R_4 short, less than $r-m$; cell 1st M_2 open by the atrophy of m .

Abdominal tergites dark brown, paler laterally; sternites dull yellow; apices of the segments darker brown; hypopygium dull yellow.

Habitat.—Washington.

Holotype.—♂, Mt. Rainier, Washington.

In many respects this is a very remarkable fly, easily told from all its relatives by the great length of vein R_2 before its fusion with R_1 . I have pointed out in another paper the reasons for changing the nomenclature of the radial veins in the Pediciini, this vein R_2 having been hitherto considered as being the radial cross-vein.

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SUBFAMILY TIPULINÆ.

Genus *Tipula* Linnæus.***Tipula margarita***, new species.

General coloration of the head and thorax light gray; antennæ short, black, the three basal segments orange-yellow; femora with a broad, subterminal yellow ring; wings with four brown cross-bands; abdomen yellow, the tergites with a broad, dark brown median and narrow dark brown sublateral stripes; lateral margin of the tergites broadly light gray; male hypopygium with the ninth tergite large, subquadrate, with a deep median split; ninth pleurite complete.

Male.—Length about 13 mm.; wing 14.4 mm.

Frontal prolongation of the head long, grayish above, more reddish laterally, nasus long and slender. Palpi with the first segment reddish, the remainder black. Antennæ with the first segment long and slender, orange-yellow, a little grayish pruinose on the basal fourth; segments two and three orange-yellow, remaining flagellar segments dark brown, the apices only a little more reddish; flagellar segments very short with long verticils, the basal swelling inconspicuous, only a little thicker than the rest of the segment. Head gray, on the disk of the vertex suffused with brown; vertical tubercle prominent, narrowly split by a deep, impressed median line; occiput more reddish.

Thorax gray, the praescutum with three dark brownish gray stripes, the median one longest, broadest in front, narrowed to the suture; scutum light gray with two darker gray blotches, the larger of which lies on the scutal lobes; scutellum light gray with a faint, reddish cast; postnotum light gray with a narrow, indistinct median brown line which is continued forwards on to the scutellum. Pleura light grayish pruinose. Halteres rather short, yellow, the knobs dark brown. Legs with the coxæ light gray pruinose; trochanters dull yellow; femora yellow, beyond the middle passing into light brown; tips broadly black, a broad, yellow subterminal annulus; this yellow femoral ring is most distinct on the fore legs, less evident on the posterior legs; tibiæ and tarsi dark brown. Wings whitish with a heavy brown pattern; dark brown blotches at the arculus, stigma, and a smaller one at the origin of the sector; four grayish brown cross-bands, the first

basal in position occupying the cubital and anal cells; the second band about mid-length of the basal cells, darkest in cells *R* and *M*, in the anal cells paler but more diffused; the third band at the cord, darkest near the stigma and along *Cu*; fourth band occupying the wing-apex, darkest in the apices of cells *R*₂ and *R*₃, caudad of these paler; base of the wing, costal and subcostal cells indistinctly tinged with yellow; veins dark brown. Venation: vein *R*₂ persistent for its entire length; petiole of cell *M*₁ shorter than this cell; cross-vein *m-cu* present, situated at about the basal third or quarter of cell 1st *M*₂.

Abdominal tergites yellow with a very broad, dark brownish black dorsal stripe beginning on segment two, continuing to segment seven; this occupies most of the dorsum of all these segments being interrupted caudally by a broad, yellowish ring; lateral margins of the tergites very broadly silvery, caudal margins very narrowly of the same colour; a narrow, interrupted, dark brownish black line just inside the gray margins; segments eight and nine brown. Sternites light yellowish brown with an indistinct, pale brownish line, the apical sternites light brown. Male hypopygium enlarged; ninth tergite very large and prominent, subquadrate, the dorsum almost flat, not chitinized; caudal margin with a very deep, narrow, median split, the adjacent lobes very broad, their apices almost truncated, very narrowly chitinized. Ninth pleurite small, complete. Ninth sternite deeply and broadly split, the margins fringed with abundant long, pale hairs that are decussate across this median notch. Eighth sternite almost straight or with a very broad, V-shaped notch, on either side with a large tuft of yellow hairs that are decussate across the median line.

Habitat.—New York.

Holotype.—♂, Ithaca, Tompkins Co., New York, June 12, 1915.

This beautiful *Tipula* is very different from any species that I have ever seen, in some ways suggesting *Tipula ternaria* Loew of Northeastern North America but in reality a very different species. The yellow subterminal annulus on the femora will separate the fly from all its relatives in Eastern North America.

Tipula kirbyana, new species.

Allied to *T. whitneyi*; general colour of the head and thorax light gray; a narrow, brown or black dorso-median vitta extends the length of the thorax and abdomen; antennæ black; femora strongly incrassated; wings indistinctly marked with pale brownish clouds; abdomen reddish yellow with a brown dorso-median black stripe.

Male.—Length 10.2 mm.; wing 11.7 mm.

Palpi dark brown. Frontal prolongation of the head moderately elongated, deep chestnut-brown, above sparsely dusted with gray; nasus lacking. Antennæ dark brown, the scapal segments a little more reddish and sparsely dusted with gray; flagellar segments rather short, deeply incised, the basal swelling shorter than the pedicel of each segment. Head gray, the vertical tubercle large, prominent, with an indistinct, brown median line that becomes indistinct behind; eyes very small, widely separated.

Thorax light gray, the usual praescutal stripes not very distinct, the median one tinged with brown; scutellum more reddish with an indistinct, median brown line; postnotum gray with a brown, median line. Pleura light gray, the dorso-pleural membrane obscure yellowish. Halteres light brown, the knobs a little darker brown. Legs with the coxæ long and powerful, light gray; trochanters chestnut-brown; femora short and stout, considerably incrassated apically, reddish brown; dark brown at the tips; tibiæ dull brownish yellow, the tips darkened; tarsi dark brown, the metatarsi paler. Wings slightly crumpled, possibly the first indications of degeneracy; membrane indistinctly blotched with brownish; cells *C* and *Sc* a little more yellowish; stigma indistinct, brown; clouds of brown at the origin of *Rs*; along the cord in cell *M*; apex of cell *1st A*, etc. Venation: vein *R*₂ persistent but pale at its tip; cell *1st M*₂ very small and short, only a little longer than broad; fork of cell *M*₁ deep; cross-vein *m-cu* obliterated by the fusion of *Cu*₁ on *M*₃₊₄.

First abdominal tergite brownish basally, the remainder of the dorsum of segments 1 to 8 light reddish yellow, the segments broadly ringed with yellowish; a very conspicuous black median vitta runs the length of the abdomen, interrupted only by the yellow caudal margins to the segments; this vitta begins on segment 1 and continues to the eighth tergite;

lateral margins of the tergites broadly yellowish. Sternites reddish brown with an indistinct, narrow, brown median line; lateral portions of the sternites infuscated, caudal margins of the segments yellowish. Male hypopygium with the ninth tergite rather prominent, the caudal margin with a broad and deep, U-shaped median notch; the basal portion of the tergite is tumid, shiny chestnut but a broad margin around the notch is flattened, the extreme edge narrowly blackened, chitinized, lateral lobes truncated. Ninth pleurite complete, semicircular; outer pleural appendage elongate-cylindrical, clothed with long, golden hairs; inner pleural appendage very long and narrow, jutting into the notch of the tergite, the outer edge clothed with long, pale hairs that project backward to produce a hystericiform appearance; apex of the appendage shiny chestnut-brown. From the ventral caudal angle of the pleurite arises a shiny, chestnut-brown, flattened lobe that is directed caudad, its apex truncated. Ninth sternite with a deep, V-shaped median notch that extends a little more than half the distance to the margin of the eighth sternite. Eighth sternite unarmed.

Habitat.—Alaska.

Holotype.—♂, Point Barrow, Alaska, July 14, 1898.

This species is closely allied to *Tipula whitneyi* Alex. from the Pribilof Islands, Alaska, but is readily separated by the full-winged males and the details of the hypopygium.

NOTE ON OVIPOSITION OF GASTEROPHILUS NASALIS L.

BY CHARLES H. T. TOWNSEND, WASHINGTON, D.C.

In the November, 1892, issue of Entomological News, pages 227-8, I published some notes on this subject, in which I stated that "I noticed the fly alight several times, always exactly in the region ventrad of the first cervical vertebræ." This observation relates to a female which I captured May 15, 1892, while it was flying at the throat of my horse, near Las Cruces, New Mexico. In the same notes I quoted Brauer's statement (Mon. Oestr., page 60) that "according to Dr. Green *G. nasalis* deposits its white eggs in the region of the throat of the horse." I further stated that I had not found the eggs of the fly, though I searched the ventral region of the throat after capturing the above female.

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On October 2 and 3, 1917, while in camp on the East Verde River, Arizona, at a point about eight miles north of Payson, altitude 4,400 feet, I took two females of *nasalis*, and noted others, flying at the throat of my horse, but in no case did they alight there. They were seen to hover directly under the animal's throat, and then dart suddenly at the muzzle. I saw this operation repeated many times before I was able to capture the fly, as this action of darting at the muzzle made the animal especially wild. On examination immediately thereafter, I found several whitish eggs with their sharp bases penetrating and adhering in the skin of the upper lip. These eggs were lost owing to the frantic struggles of the horse at the time, but similar eggs were dissected from the abdomen of the fly.

The egg is practically the same size and shape as that of *intestinalis* and not at all like that of *haemorrhoidalis*, but the anal end is moderately pointed though somewhat blunt as seen under a high power. It is capable, however, of penetrating tender skin, as tested on the back of my finger. Moreover, the chitinized clasping forceps at the end of the heavy ovipositor are quite sharp in *nasalis*, while they are decidedly blunt in both *intestinalis* and *haemorrhoidalis*.

On the East Verde *intestinalis* was common but caused no such alarm as did *nasalis* while ovipositing. No specimen of *haemorrhoidalis* was seen anywhere in that region.

The above facts seem to indicate that *nasalis* oviposits about the muzzle of the horse, hovering under the throat merely as a preliminary while seeking a good opportunity to dart at the lips, and piercing the tender skin with the sharpened forceps of the ovipositor while thrusting the anal end of the egg into the puncture. It seems further that this habit of darting at the muzzle of the animal was known to Linnæus, else why should he have named the species *nasalis*? It appears that in later times the preliminary action of the fly in seeking the throat has been commonly observed and its darting thence to the muzzle, overlooked by some investigators though recorded by others, hence the mistaken opinion still held by some that it oviposited in the region of the throat. It is against all reason that the eggs should be placed under the throat,

since they would be least likely to reach the mouth from such location.

It may be added that *Gasterophilus* has no incubating uterus, but that the large ovaries are packed with eggs which come down a few at a time for deposition. The eggs of the above *nasalis* female show no incubation, and the chorion is transversely corrugated so that it holds on insertion in the skin. All the records of lip and muzzle oviposition of this species that I have seen state that the eggs are attached to the hairs. This might easily happen when the fly misses its mark, and no doubt it misses frequently, but the effort is evidently directed at the tender skin of the lips. The eggs are sticky when freshly extruded, and the fly may even, at times, inadvertently leave them on the hairs of the throat when caught by the convulsive movements of the intended host. This would explain throat oviposition records.

AN ANNOTATED LIST OF THE CERAMBYCIDÆ OF CALIFORNIA.

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(Continued from page 213.)

141. *Gaurotes cressoni* Bland.
Rare in Northern California. Several taken by Van Dyke in Marin County on flowers of the wild honey-suckle in April.
142. *Leptura obliterated* Hald.
Breeds in Douglas spruce, sapwood of redwood, and other coniferous trees. Found in the coast counties from Santa Cruz to the Oregon line.
143. *Leptura soror* LeConte.
Found throughout the Sierras at altitudes of 4,000-8,000 feet, usually on flowers of veratrin. Taken by author at Donner Lake and Tahoe Tavern, breeding in branches of *Pinus ponderosa*. July 1-21.
144. *Leptura propinqua* Bland.
Found north and in the higher Sierras on various flowers. Breeds in various coniferous trees. Taken by author at Donner Lake. July 10.

145. *Leptura kerniana* Fall.
Taken by Daggett on the Kern River.
146. *Leptura plagifera* LeConte.
Taken rarely in northern Sierras. Found especially on the eastern sides of the Cascades.
147. *Leptura rubida* LeConte.
Rare. Taken in Northern California, Coast belt to San Francisco, and in Sierras—a different colour phase in each section.
148. *Leptura subargentata* Kirby.
Common at Camp Meeker, Sonoma County.
var. *ruficeps* LeConte.
Found throughout the Sierras.
var. *rhodopus* LeConte.
Breeds in tan bark oak.
var. *similis* Kirby.
149. *Leptura molybdica* LeConte.
Fairly common throughout the State on various flowers. Taken by Fall at Pasadena on Ceanothus; by Van Dyke in Sierra County, and the middle and northern Sierras.
150. *Leptura lata* LeConte.
Found throughout the State; not abundant anywhere, most common in the foothills of the Sierras. Found by Van Dyke on flowers, especially those of California wild holly. Bred by Rivers from live oak. Taken by author at Donner Lake, July 12.
151. *Leptura tribalteata* LeConte.
Found in Northern California and Sierras as far south as Walker Basin. Taken by author at Donner Lake July 6 on meadow flowers.
152. *Leptura coquilletti* Fall.
Taken on flowers of *Eriogonum fasciculatum* in June by Ricksecker. Taken by Van Dyke in Sierra Madre Mts., San Bernardino Mts., and also Los Angeles County.

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153. *Leptura impura* LeConte.
Taken rarely in the redwood belt of Sonoma County. One specimen taken by Van Dyke in Siskiyou County. Supposed by Blaisdell to breed in the sapwood of redwood.
154. *Leptura instabilis* Hald.
Taken in moderate numbers in parts of Northern California and in Sierras. Rare in June on Pomona foothills. Taken by Van Dyke on lupine at Tahoe; by author at Donner Lake, July 3.
155. *Leptura sexmaculata* Linne.
Northern, barely running over into this State. Breeds in spruce.
156. *Leptura barberi* Fall.
Taken in Humboldt and Shasta Counties. Breeds in the Sitka spruce. Rather rare.
157. *Leptura vexatrix* Mannerheim.
Found on umbelliferous flowers, yarrow, etc., through the Sierras from Siskiyou County south to Calaveras County. This is considered by Van Dyke as a variety of *quadrillum* Lec.
158. *Leptura sexspilota* LeConte.
Taken abundantly in Southern California by Van Dyke in May and June on flowers of greasewood; also taken near Los Angeles on wild walnut. Taken at San Pedro Martir, Lower California.
159. *Leptura matthewsii* LeConte.
Never found on flowers, but resting on leaves. Found in the Coast belt from Marin County to the northern line. Has been bred from the sapwood of the redwood. June 27.
160. *Leptura grossa* LeConte.
Rare in the Sierras, on veratrin flowers. One taken by Van Dyke on stump of *Pinus ponderosa* in Yosemite Valley.
161. *Leptura brevicornis* LeConte.
Found rarely in the north and in the Sierras. Breeds in *Pinus ponderosa*. Taken by author at Donner Lake. July 7.

162. *Leptura nigrella* Say.
No data.
163. *Leptura carbonata* LeConte.
Northern California.
164. *Leptura subcostata* Fall.
One specimen taken by Fall at Tahoe.
165. *Leptura dehiscens* LeConte.
Rare, in the Sierras; northern, one specimen taken by Van Dyke in Siskiyou County. Four taken from small limbs of *Pinus ponderosa* at Calistoga by author. May 28.
166. *Leptura sanguinea* LeConte.
Found in Northern California and throughout the Sierras on veratrin and other flowers. May 30-July 17.
167. *Leptura letifica* LeConte.
Taken in Sierras and Northern California; common in places in Shasta Lake, and Sonoma Counties on flowers of *Eriogonum*, etc. May 25-June 19.
168. *Leptura pernigra* Linnell.
Taken in Sierras Madre Mts., Los Angeles County by Van Dyke.
169. *Leptura quadrillum* LeConte.
Found on yarrow, etc., in the northern part of the State.
170. *Leptura chrysocoma* Kirby.
Common in the Sierras and Northern California on veratrin, yarrow, and other flowers. Taken in large numbers at Donner Lake and Tahoe by the author in July. July 1-21.
171. *Leptura dolorosa* LeConte.
Found especially on the *Ceanothus* in Northern California and the Sierras; common in places.
172. *Leptura crassipes* LeConte.
Found throughout the State, common in the northern part, less common in the south. Taken by Fall in the San Bernardino Mts. Usually found on the flowers of the yarrow, ox-eyed daisy, etc. Bred from *Umbellularia californica* by Rivers and Van Dyke. Bred from *Eucalyptus globulus* by Van Dyke. Taken by author at Calistoga. May 21.

173. *Leptura behrensii* LeConte.
Rare Two specimens taken by Baumberger in Northern Sonoma Co.; type specimen from Mendocino Co.; one taken by Van Dyke in Humboldt County.
174. *Leptura scripta* LeConte.
Common on Coast belt from Marin County to northern line on flowers, especially Azalea, Rhododendron; rare in the various parts of the Sierras. June 9.
175. *Leptura gnathoides* LeConte.
Found in Sierras and Northern California. Rare. Taken in Placer County by Van Dyke on young trees of post cedar.
176. *Leptura valida* LeConte.
Found rarely from Shasta to the Southern Sierras. Breeds in pine. Taken by author at Donner Lake. July 18.
177. *Leptura insignis* Fall.
Taken by Fuchs and Fenyés at Monterey. Breeds in Monterey pine; remains also found in *Pinus muricata* at Inverness; a specimen was bred by Van Dyke from Douglas spruce branch of unknown locality.
178. *Leptura aspera* LeConte.
Northern, may possibly run over into California.
179. *Leptura cubitalis* LeConte.
This species, which looks like an *Acmaeops*, is fairly common in the middle part of California. It is found on wild rose, etc., in Sonoma, Napa, San Mateo, and Lake Counties. June 8-29.
180. *Ophistomis ventralis* Horn.
Taken at El Taste, Lower California.
181. *Strangularia delicata* LeConte.
Occasionally found in most parts of the State, but is more common in the north and middle Sierras on various flowers. June 3.

(To be continued)