



MALE GENITALIA OF TAENIOCAMPA.

The Canadian Entomologist.

Vol. XLII.

LONDON, OCTOBER, 1910.

No. 10.

NOTES ON CERTAIN TÆNIOCAMPA SPECIES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

In the CANADIAN ENTOMOLOGIST for June, 1910, Mr. F. H. Wolley Dod has some very interesting notes on certain noctuids, among them some *Teniocampid* species, in which I have made some studies of my own in time past, and again more recently.

Mr. Dod certainly has an excellent eye for species, and I would as soon trust his comparisons as those of any one I know. But when it comes to a question of determining the *status* of a species, surely we have gotten a little beyond the point when a mere statement that no material differences can be observed, or that they "run together," can be considered as sufficient.

Mr. Dod says that *alia* Gn., is not a *Teniocampa*, but is an *Hadena*, and the same as the form named *suffusca* by Morrison. In that I am quite willing to follow him, although the type passed the previous scrutiny of Grote, Edwards and Hampson, as well as myself and the others who have looked over the collection. Mr. Dod states that the name *hibisci* Gn., must now be used, although he has seen neither type nor, apparently, description. He is seemingly unfamiliar with the fact that Gueneé's name has no type; that the description is based on a figure, and that, as I pointed out in my Revision of *Teniocampa*, the description was obviously that of Mr. Morrison's *confluens*. We get again the unfortunate condition of the type form of a species being represented by what is really rather an aberration than even a variety. Fitch's name, *instabilis*, will then represent the usual form that we have been accustomed to call *alia*.

Mr. Dod also points out that *pacifica* Harv., has been misidentified heretofore, or rather that specimens not identical with it have been confused under the same name. Again Mr. Dod is probably correct. Dr. Harvey's description specifically calls attention to the absence of the orbicular, although that feature also occurs in specimens of the confused species. In the original description Dr. Harvey refers to his three examples as females, Hampson refers to the types as males, while Mr. Dod refers to a female type. The single example in my collection is not marked Canada, as Mr. Dod says, but "Corvallis, Oregon, IV, 22 at light."

The species is really unique in many ways, and the sexual structures of the male are characteristic and quite, unlike those of the allied forms.

In his reference to the species known as *pacifica* Auct., Mr. Dod altogether ignores the fact that I pointed out and figured differences in the genitalic structures of the males between the common eastern and the common western forms, and that, before his statement that the one was a variety of the other could be properly accepted, it was "up to him" to prove that the differences figured were evanescent or non-existent. Instead of that, he does not even refer to them. In view of recent developments in other genera, this method of dealing with the subject will hardly be accepted.

Mr. Dod goes further, and says that my *5-fasciata* is also a mere variation of *hibisci*, and then proposes *latirena* without description and without type, for a form that supposedly is not *5-fasciata*. He thus gives us a mere name, that avowedly does not apply to anything, and instead of writing his own name after it he credits it to "Auct.," whoever that may be in this case; because, so far as I know, no one ever used that term before. Furthermore, *5-fasciata* cannot, as matters stand, be a form of *latirena*; but *latirena* might be a form of *5-fasciata*; with almost as unfortunate a result as making *instabilis* Fitch a form of *hibisci* Gn.

Looking over my material in this group, I find a series of rather more than 40 examples included under the term *pacifica*, reckoning into this also my *5-fasciata*. Of *alia* (*instabilis*) there are thirteen, most of them females; as to localities, they extend across the Continent and down the Pacific Coast to Alameda, California.

This entire series was first separated out carefully into groups, on superficial characters, irrespective of localities, and the groups were afterwards subgrouped according to distribution where there was any difference. Finally, twelve males were selected to represent all possible subdivisions, and of these the abdomens were removed, macerated in caustic potash and the genitalia afterward removed entire.

It might be said here, that nowhere in this series were there hair-pencils or other secondary sexual characters found anywhere on the abdomen. The dissections were made by me, carefully numbered to correspond with the specimens from which they were taken, and each structure, after being cleaned and washed, was placed by itself in a small vial with sufficient carbolic acid to cover, and left to clear. The whole of the dissected material was then turned over to Mr. Grossbeck, who mounted it on slides and made sketches of the various mounts without any knowledge of the specimens from which they came. He selected out six

different types, and his selections agree, except in one instance, with my tentative separation on superficial characters.

After the sketches were made and verified, every other male in the series where the sexual structures were not fully retracted was closely examined, the scales being removed wherever necessary, so as to make sure of the correctness of the association. It is interesting to note that in the whole of what may be termed the *instabilis* series the penis sheath is unusually long, and is furnished at tip with a very long corneous spine, set at right angles to the stem. I am aware that I should have examined a series of females to determine the function of this structure, if possible; but that can be easily done later by some younger man with more leisure than I.

It was also noted that there were two types of uncus represented; one with a spear-shaped tip, the other tapering to a normal point. I am not quite sure how much absolute value should be attributed to this. All the eastern males, *hibisci* and *instabilis*, and all the Calgary males, have the spear-shaped tip. With one exception all the western forms, *pacifica* "Auct.," have the slender, gradually pointed tip.

The common eastern form will, if Gueneé's description based on a picture is accepted, be known as *hibisci*, with *confluens* Morr. as a synonym, and of this I have at present one ♀ from Long Island, N. Y. The more normal type, which is *instabilis* Fitch, is represented from New Jersey to Maine, Canada, and westward to Decorah, Iowa, and Volga, So. Dakota. It has a reddish-gray base, is mottled with darker brown, slender, transverse strigæ, not so closely placed as to obscure the maculation, s. t. line fairly marked, with obvious reddish-brown preceding shades. The median lines tend to become lost, especially in the female; but they are usually traceable as shadings if not otherwise. The reniform is always, the orbicular is usually uniformly dusky, and outlined by a narrow pale line. A reddish or somewhat dusky median shade may or may not be obvious. On the whole the species is a quietly-marked one, and its dominant impression is of a reddish-gray form.

The male genitalia are characteristic. The uncus is spear-shaped at tip, the clasper long, stout, curved, scarcely dilated medially; the harpes are inferiorly drawn out into a long tip, in an almost direct continuation of the inferior margin; upper angle acute, but not drawn out, the tip oblique and not arcuate. Reference is made to figure 1 of Plate VIII for a better understanding of the structure.

An intensification of this type occurs in Colorado, and may be known as *Brucei*. It is brighter, more reddish-gray, the transverse strigæ are less

obvious, the median lines are better marked, the s. t. line is preceded by a more obvious reddish shade, and the median shade is well marked in the male and conspicuous in the female. It really looks more like *subterminata* (*revicta*) at first sight; but closer study shows it a more brilliant *instabilis*.

As to sexual structure, the type is very similar to that described for *instabilis*, with the following differences: The uncus is not spear-shaped at tip, but is slender and drawn to a long point; the lower angle of harpe at tip is not drawn out on a line with the lower margin, but forms a slight curve; the upper angle is a little produced, so that the tip seems, and actually is, broader than it is nearer the base. The clasper is more slender and not so large.

Again reference is made to Plate VIII, and figure 2 should be consulted and compared to bring out the differences. These two figures, 1 and 2, should be compared with those of the following, particularly in the form of the tips of the harpes.

Only two examples of this form are at hand: The male from Denver, Colorado, IV, 20; the female from Garfield Co., Colorado, 6,000 feet (David Bruce).

Under the name *malora*, I have separated out three males and two females from Calgary, IV, 24, and V, 2, which may be described as being *instabilis* with practically all the red eliminated. It is a dull gray-looking form, with the transverse strigation very dense and coarse, giving a smoky impression. The median lines are fairly obvious, the t. a. line tending to become a band, while the t. p. line may have a paler following shade. In most cases a broad, obscure diffuse median shade is obvious. The s. t. line is pale, not distinct, and the preceding shade is not well marked nor tinged with red. Altogether the impression is of a dull smoky-gray form.

The genitalia of the male are interesting, and are identical in the three examples studied. The uncus is spear-shaped at tip, as with *instabilis*, but the harpes are quite different. They are decidedly more curved, distinctly narrowed before tip, the lower margin prolonged into a long-curved spine, the upper angle drawn out into a little point, while the outer margin is distinctly arcuate. A modification of this type of tip occurs in all the other western forms, in contrast to the *instabilis* type shown in figures 1 and 2. Figure 3, representing this species, should also be compared with the next following. The primary clasper is a long curved hook without obvious dilations.

An irregularly-mottled form, for which I propose the term *nubilata*, occurs in Colorado. It ranges from gray to almost brick-red, the transverse

strigæ are coarse and irregularly distributed, and the median lines are fragmentary and indicated rather by cloudings or groupings of the strigæ. Almost all the examples are more or less mottled along the costal area with yellowish, and atoms of this colour are more or less obvious throughout the wing. The median shade may be absent or may form a cloud, taking in most of the median space. The s. t. line is yellowish, usually distinct and usually also with a fragmentary preceding shade. The ordinary spots are large, outlined in yellowish, the reniform dusky, orbicular irregular and reaching to or uniting with the reniform more frequently than in the other forms.

Unfortunately, in the series of 10 specimens, there are only two males; but these are alike in genital structure and are quite different from any other species. The uncus is rather stout, drawn out to a gradual point. The harpes narrow to an unusually short small tip, which has only a little, short acute process inferiorly and has the upper angle rounded. It represents the extreme in reduction in this series. The clasper is stout, moderate in length, not so much curved, and is distinctly enlarged or dilated at about its middle. Figure 4 shows obviously the characteristic differences between this form and all others of the series.

Localities are: Garfield Co., Colo., 6,000 ft. (Bruce); Glenwood Springs, Colo., May 6 (Barnes); Denver, Colo., IV, 20.

On the Pacific Coast there are three or four species aside from the true *pacifica*, but the material is not so satisfactory in this series as I could wish.

First of all is a species that I call *inflava*. It is quite a uniform carneau-gray, not mottled, without transverse strigæ, median lines lost, s. t. line very distinct, yellow, with scarcely marked preceding shades, the ordinary spots distinctly outlined in yellow. The very even colouring, contrasting s. t. line and rather conspicuous ordinary spots characterize the species superficially.

I have only two males and one female from Pullman, Washington, and Vancouver, B. C., all taken in April. The males, which resemble each other closely, although they come from the two extreme localities, differ in genital structure from all the other Pacific Coast forms by having the tip of the uncus spear-shaped. In other respects the resemblance to *inherita* is rather close, as an examination of figure 5 will make clear. I believe this to be a good species, but the material is scant and the possibility of error is not excluded.

Inherita might be mistaken at first for a well-marked, robust *malora*. It is generally pearl-gray, but occasionally becomes tinged with reddish.

The transverse strigæ are usually very fine, and give the surface a characteristic irrorate appearance. The median lines are generally lost, except on costa; but there is usually an obvious or even conspicuous median shade which may be quite well defined or quite diffused. The s. t. line is narrow, pale, usually preceded by a fairly well-defined though narrow preceding brown shade. The genitalia of the male differ from all those previously described by the short, stout, strongly-curved clasper, which is distinctly dilated at about its middle. The tip of harpes is only moderately elongated, strongly constricted before its terminal enlargement, and the inferior margin is prolonged into a moderate curved extension. The uncus is slender, tapering to tip, and in that respect it differs from *inflava*. Figure 6 will illustrate the structure more satisfactorily.

It might be added that there is the same tendency here for the ordinary spots to become confluent, that is found in *nubilata*. I have seven males and one female from Corvallis, Oregon, March 31st to April 29th; Olympia, Washington, April 7th; Vancouver, B. C., April 6th.

T. 5-fasciata Smith is another of those species resembling *subterminata* in superficial appearance and habitus. It is of a pale carneous-gray, more or less shaded with reddish, without transverse strigæ and with all transverse lines and markings distinctly written. The species is absolutely not to be confused with anything else. I have at present four males and two females from Wellington and Vancouver, B. C., and Pullman, Washington.

In genital structure this species resembles *inherita*, but the clasper is much longer, much more slender, the harpes are longer, much more constricted before tip, and the curved process from lower angle of tip is much larger in all respects. Figure 7 will show these points more satisfactorily.

A single male example from Alameda County, California, in January, differs superficially from *inherita*, but agrees almost exactly in genitalic structure. It is at least an even chance that it is only a local form of *inherita*, but I will call it *proba*. It is rather uniform brick-reddish in colour, with rather coarse, purplish transverse strigæ, not very closely placed, a tendency to yellowish irrorations, median lines marked on costal region only, no obvious median shade, s. t. line yellowish, narrow but well defined, without shadings on either side. The ordinary spots are narrowly pale-ringed; orbicular concolorous, reniform darkened by purplish strigæ. The secondaries are shining yellowish.

T. pacifica Harvey, as identified by Mr. Dod, is altogether different from any of the species above mentioned in appearance and structure. For comparison the genitalia are shown at figure 8 on the plate.

My conception of the synonymy of our species of *Taeniocampa* of the *instabilis* section is as follows :

- T. instabilis* Fitch.
- alia* Auct., in error, not Gueneé.
- var. *hibisci* Gn.
- confluens* Morr.
- T. Brucei* Smith.
- §*pacifica* Auct.
- T. malora* Smith.
- T. nubilata* Smith.
- T. inflava* Smith.
- T. inherita* Smith.
- T. 5-fasciata* Smith.
- T. proba* Smith.
- T. pacifica* Harvey.

Taeniocampa latirena Dod has no type, and is impossible to apply except as a synonym of the entire *pacifica* Auct. series.

I might add, in this connection, that I do not accept Mr. Dod's reference of *T. saleppa* to *T. præses*, but must reserve my comments on that point for another occasion.

HOSTS OF STREPSIPTERA.

BY CHARLES ROBERTSON, CARLINVILLE, ILL.

Mr. W. Dwight Pierce has recently published a monographic revision of the Strepsiptera, as Bulletin 66 of the U. S. National Museum. This paper brings up a number of interesting points regarding some of the hosts of these parasites. For some time I have had occasion to identify many insect visitors of flowers, and, while no insects were collected and none were carefully examined for that purpose, I have marked the specimens on which the parasites were noticed, so that they could be taken out when wanted. The result is that, while I have only recorded three cases, and have made no effort to anticipate any one, I am able, with the records here given, to be the first to record 30 per cent. of the known North American Hymenopterous hosts, and my collection contains 36 per cent. of them. That one man could do this in one locality, with a few observations in

another, shows the fragmentary nature of the material upon which Mr. Pierce's observations are based.

The following is a list of these species. The parasites of 1, 3, 4, 11-13 and 21 are described by Pierce, and 7, 22 and 29 are mentioned in his host list. The others are new. 1, 4 and 7 are recorded in Trans. Am. Ent. Soc., XVIII, 52-59, 1891:

CARLINVILLE, ILL.

ANDRENIDÆ.

1. *Trachandrena claytonia*.—April 1.
2. " *nuda*.—March 17.
3. " *hippotes*.—April 10.
4. *Andrena illinoensis*.—April 17.
5. " *salictaria*.—April 2, 10, 11, 12, 17.
6. " *mandibularis*.—March 21, 29, April 10.
7. *Ptilandrena erigenia*.—April 11.
8. *Parandrena andreoides*.—April 1, 10, 11, 26, 29.
9. *Pterandrena asteris*.—Sept. 8.

HALICTIDÆ.

10. *Augochlora viridula*.—Sept. 17.
11. *Chloralictus sparsus*.—April 19, May 31, July 15, 27, Sept. 11, 17, Oct. 20, 25.
12. *Chloralictus versatus*.—April 11, Nov. 3.
13. " *zephyrus*.—April 12, July 21, 24, 27.
14. " *nymphæarum*.—

PANURGIDÆ.

15. *Pseudopanurgus labrosus*.—July 3.
16. " *labrosiformis*.—Aug. 3.
17. " *rudbeckia*.—Aug. 1, 29.
18. " *solidaginis*.—Aug. 11, 12.

SPHECIDÆ.

19. *Sphex vulgaris*.—June 5, Oct. 9.
20. " *pictipennis*.—
21. *Proterosphex ichneumoneus*.—Aug. 26.

VESPIDÆ.

22. *Polistes variatus*.—Sept. 30.

EUMENIDÆ.

23. *Ancistrocerus tigris*.—Sept. 23.
24. " *histrionalis*.—Aug. 5, 27.
25. " *clypeatus*.—May 24, 31.

26. *Leionotus anormis* (*taos*).—May 31, Oct. 29.
 27. “ *fundatus*.—June 25, July 19.
 28. “ *arvensis*.—Aug. 2.
 29. “ *foraminatus*.—Aug. 13.
 30. “ *pedestris*.—July 6.

ORLANDO, FLA.

31. “ *fundatiformis*.—Feb. 17.

INVERNESS, FLA.

32. “ *bifurcus*.—March 3.
 33. “ *turpis*.—March 19.
 34. *Ancistrocerus histrio*.—March 20, 24.
 35. *Odynerus erynnys*.—Feb. 10, March 10, 25.

TEXAS, BELFRAGE.

36. *Trachandrena verecunda*.—Cresson, in Col. Am. Ent. Soc. *Types*.

The following host species, followed by the number of species of flowers on which each was taken, have not been observed to be infested at Carlinville :

- Eumenidæ.—*Monobia quadridens*, 12; *Ancistrocerus campestris*, 18.
 Vespidae.—*Polistes annularis*, 20; *P. metricus*, 43; *P. rubiginosus*, 18.
 Sphecidae.—*Proterosphex pennsylvanicus*, 13; *Priononyxa atrata*,
 38; *Sphex intercepta*, 52; *S. procera*, 35.
 Halictidæ.—*Chloralictus albipennis*, 17.
 Andrenidæ.—*Andrena corni*, 1; *A. Nasonii*, 14; *A. nubicula*, 6;
Opandrena bipunctata, 33; *O. Cressonii*, 54; *O. Robertsonii*, 7;
Ptilandrena Polemonii, 3; *Pterandrena solidaginis*, 14.

The determination of *Ptilandrena Polemonii*, which Pierce marks doubtful, is probably incorrect. *Andrena illinoensis* is probably incorrectly determined, though it is a *Stylops* host. After I described *A. illinoensis* I mixed *salictaria* with it, and I may have sent out this species under the former name. I have suspected that the bee identified as *Chloralictus albipennis* might be *nymphæarum*. And it seems strange that I should find *Pterandrena asteris* stylopized, but not *P. solidaginis*. Nevertheless, it is evident that the geographical range of the Strepsiptera is not so closely correlated with that of the hosts as might be expected, if every parasite is a distinct species. In Florida, where I observed only 22 flower-visits of *Odynerini*, I found 5 infested species, while in Illinois I found only 8, after observing 339 flower-visits.

Pierce gives a list of 14 Andrenidæ in which the transverse cubital nervures are sometimes wanting. The list is credited to Crawford, but, except for one name, it was copied from my list in Tr. Am. Ent. Soc., XXVIII, 189, 1902.

Of the 14 species, 7 are known to be parasitized, a pretty good percentage. There is evidently a relation, but not what is supposed by Pierce and Crawford. *Prosopis* has a nervure wanting, and so do the Panurgidæ. In a general way small bees seem to be more likely to be stylopized, and more likely to lose the transverse cubitals. I have observed these nervures wanting in the following 18 species of local Andrenidæ: *Andrena arabis*, *nubicula*, *nothoscordi*, *erythrogastra*, *geranii*, *illinoensis*, *platyparia*, *Pterandrena asteris*, *solidaginis*, *krigiana*, *Opandrena bipunctata*, *personata*, *Robertsonii*, *Cressonii*, *Trachandrena claytoniæ*, *hippotes*, *Forbesii*, and almost always in *Parandrena andrenoides*. Nine of these are stylopized species. The species of *Andrena* are small or middle-sized. Those of *Pterandrena* are the smallest. *Trachandrena* is composed of middle-sized species, but *claytoniæ* is the smallest. Among bees, at least, the stylopized species are generally small, and they are the ones usually losing a transverse cubital. Among some large bees, when the second cubital cell is small and the nervures closely approximated, there is a tendency for one of the transverse cubitals to be obliterated. Among the Nomadidæ, which are not stylopized, I have found a transverse cubital wanting in *Centrias americanus*, *rubicundus*, *Phor integer*, *Gnathias cuneatus*, *Nomada Cressonii*, *Sayi*, *illinoensis*, *parva*, and almost always in *Heminomada obliterated*. In Sphecodini I have found transverse cubitals wanting in *Sphecodes arvensis*, *Drepanium falciferum*, *Sphecodium pimpinellæ*, *Cressonii*, *Macheris stygia*, and always in *Dialonia antennariæ*. The veins are wanting in 17 out of 49 Andrenidæ, 9 out of 23 Nomadidæ, 6 out of 12 Sphecodini. The second transverse cubital is sometimes wanting in *Chloralictus sparsus*, which is a stylopized species, and almost always in *Dialictus anomalus*, which is not known to be so. Thus the tendency to obliteration is no more evident in the Andrenidæ, which are stylopized, than in the Nomadidæ and Sphecodini, which are not. The apparent correlation is the result of the occurrence of both phenomena in bees of small size.

In regard to the copulation of stylopized bees, I have observed three cases: *Andrena salictaria*, both sexes bearing Stylops; *Parandrena andrenoides*, the ♀ stylopized; *Pseudopanurgus rudbeckiæ*, the ♂ stylopized.

On page 41 Pierce says: "The majority of the hosts known are flower-frequenters, and are classed as oligotropic when visiting a single species, genus or family of flowers, and polytropic when visiting many genera or families of flowers. It is very reasonable to infer that the most ordinary method of transfer of triungulids takes place at flowers, because of the analogous forms of strepsipterous and rhipiphorid triungulids. Most of the wasps are flower-visitors, because they can quench their thirst in the nectarine liquids. They are consequently polytropic; but the bees are more highly developed, and often specially adapted for particular flowers, hence many of them are oligotropic." Loew introduced these terms to distinguish bees like *Bombus*, which fly all season and visit a great variety of flowers, which he called polytropic, from bees like *Anthophora*, which have a short flight and visit comparatively few flowers, which he called oligotropic. He calls the females of *Halictus* polytropic, and the males, which appear late and fly a shorter time, oligotropic. In their visits for nectar bees resemble other flower-visitors, but in the visits of the females for pollen to provision their nests, bees show their essential bionomic relations to flowers and their essential differences from other insects. Therefore, being the first to use Loew's terms, at least in English, I limited the term oligotropic to bees which collect pollen from flowers of some particular natural group, and the term polytropic to those which use pollen from unrelated flowers. (*Bot. Gaz.*, XXVIII, 27, 29, 1899) I have recorded 56 cases of these oligotropic bees. Of these only 20 are limited in their nectar visits also. Of 17 local stylopized Andrenidæ, only one is oligotropic in the sense used by Pierce. Most of the 20 are oligotropes of Compositæ. It is not so surprising that some of these are exclusive when we consider that at their maximum the Compositæ form 34 per cent. of the indigenous blooming flowers. I do not regard statements that a bee is oligotropic, unless made by a person who has made a great number of observations on flowers, and who distinguishes whether the females collect the pollen or not. Wasps have never been called polytropic except by Pierce. If these terms are applied to wasps, they should be used to distinguish wasps which provision their nests with insects of the same natural group from those which use an indiscriminate variety of insects for that purpose.

On flowers wasps are hardly polytropic in any sense. I have observed 1,949 flower visits of 208 species. The ones making 40 or more visits are: *Scolia bicincta*, 40; *Eumenes fraternus*, 41; *Polistes metricus*, 43; *Sphex vulgaris*, 46; *Myzine sexcincta*, 50; *Polistes variatus*, 51; *Sphex intercepta*,

52; *Leionotus foraminatus*, 53. *Leionotus foraminatus* is surpassed in number of visits by 27 species of bees. I have observed 6,142 flower visits of 297 species of bees. The average for wasps is 9, and for bees 20.

Pierce gives a table of 17 species of stylopized Andrenidæ, of which only three appear to be oligotropic in the sense in which he uses the term. In my table of oligotropes, one of these was stated to visit two other flowers besides *Polemonium*. At least five are oligotropic in the sense used by me.

The following table contains 17 species of local Andrenidæ, eight of which are oligotropic and nine polytropic :

HOST BEES.	Visits for pollen.	Visits for nectar to related flowers.	Visits for nectar.	Visits for nectar to unrelated flowers.	Total.	Time of flight.	Visited for pollen.
OLIGOTROPES.							
<i>Ptilandrena erigenia</i>	1			2	3	Mar. 26-May 14	<i>Claytonia virginica</i>
" <i>polemonii</i>	1			3	3	Apr. 20-May 20	<i>Polemonium reptans</i>
<i>Parandrena andrenoides</i>	3	1		9	13	Mar. 20-June 5	<i>Salix</i>
<i>Andrena illinoensis</i>	3	1		4	7	Mar. 25-May 24	"
" <i>salictaria</i>	4			7	11	Mar. 31-June 22	"
" <i>nubicula</i>	5	1		7	6	Aug. 13-Oct. 30	"
<i>Pterandrena asteris</i>	6	2		1	9	Sept. 8-Oct. 21	Compositæ
" <i>solidaginis</i>	9	2		3	14	Aug. 13-Oct. 22	"
POLYTROPES.							
<i>Opandrena bipunctata</i>	15		18		33	Mar. 17-June 1	8 families
" <i>Cressonii</i>	35		19		54	Mar. 21-June 14	15 "
" <i>Robertsonii</i>	5		2		7	May 4-July 7	4 "
<i>Andrena corni</i>			1		1	June 8	"
" <i>mandibularis</i>	7		12		19	Mar. 17-May 22	5 "
" <i>Nasonii</i>	10		4		14	Apr. 21-May 31	5 "
<i>Trachandrena claytonia</i>	17		17		36	Apr. 10-June 19	8 "
" <i>nuda</i>	7		11		18	Apr. 10-June 29	4 "
" <i>hippotes</i>	9		7		16	Mar. 17-June 16	5 "
<i>Chloralictus zephyrus</i>					68	March-Nov.	"
" <i>sparsus</i>					141	" "	"
" <i>versatus</i>					217	" "	"
OLIGOTROPES.							
<i>Pseud. labrosiformis</i>	7	4			11	Aug. 3-Sept. 25	Compositæ
" <i>labrosus</i>	3	1			4	" 1- " 28	"
" <i>rudbeckiæ</i>	5	1			6	" 1- " 12	"
" <i>solidaginis</i>	4	3			7	" 11-Oct. 4	"

The facts about the flower visits of stylopized bees are about as follows: *Prosopis* is essentially polytropic. The Andrenidæ are partly oligotropic and partly polytropic. Of 44 species which I have observed

enough to justify an opinion, 22 are oligotropic and 22 polytropic. It is doubtful whether a true *Panurginus* occurs in America. *Pseudopanurgus* is composed of oligotropes of Compositæ. The Halictidæ are among the most polytropic of bees, only being surpassed by *Apis* and *Bombus*. The general character of the hosts does not show that it is an important matter whether the hosts are oligotropic or not. Among the Andrenidæ in particular, it does not appear that oligotropic species are any more apt to be infested than polytropic. There is a better basis for the proposition that the Strepsiptera prefer bees of small size. Pierce says: "No relationship can be found between the parasites and the artificial subgenera designated for *Andrena* by Robertson." One would hardly expect them to show any relation to artificial subgenera. Even if my divisions of Andrenidæ could be shown to be artificial, it would not follow that there are no natural groups into which the species fall. The fact that Pierce can only arrange the Stylopidae in the alphabetical order of their names, does not indicate that they are likely to conform to any natural groups. If Pierce's statements about the importance of observing the flower visits of the hosts were valid, my genera would be valuable for his purpose, for four of them, *Iomelessa*, *Parandrena*, *Ptilandrena* and *Pterandrena*, are oligotropic. The preference of Strepsiptera for particular hosts does not appear to be of any decisive value in determining the taxonomy of the hosts. The Xenidæ infest the Halictidæ, and then, instead of extending to the Andrenidæ, which Pierce includes in the same family, they pay their attentions to Vespidae, Eumenidæ and Sphecidae. They even infest the Panurgidae, which are more nearly related to Andrenidæ than to the Halictidæ. *Stylops* seems to show a fine sense of specific distinctions, but to be quite stupid in regard to natural groups. I think that if statistics be applied to the measurements of the stylopized and non-stylopized species, it will establish a strong general presumption that *Stylops* prefers small species of Andrenidæ without regard to their natural grouping.

While it is probable that some species of *Stylops* limit themselves to particular species of Andrenidæ, there is a strong presumption that some of them do not. The validity of the species can only be established by the ability of the taxonomist to identify them without knowing the hosts from which they come.

Pierce's names suggest an interesting taxonomic matter which does not seem to have been properly considered. This is not the only case I have noticed, nor the worst, but is a fair example. To prevent endless changes, a good many taxonomists have, with reason, decided that a name

belongs to the thing to which it is assigned, and cannot be emended on account of some error connected with its formation. The decision that caconyms shall not be emended does not imply that the rule that names should have a respectable Latin form is not a good one, or that authors need not exercise any care about their construction. One who holds that caconyms should not be emended, ought to be careful not to oppress biological nomenclature with linguistic monstrosities. While I have tried to avoid making caconyms, I believe that they should be emended, and that some day they will be. Scientific minds do not have any particular reverence for the opinions of their predecessors, particularly the dogmatic ones, and some day the name-sharps will have little to do but emend caconyms. Take the case of *Xenos*--Rossi, Kirby, Hoeven, Saunders, Pierce; *Xenus*--Rye, Cent. Dictionary. Pierce says *Xenos* is from $\xi\nu\nu\sigma$ or $\xi\nu\nu\sigma\sigma$. So *Xenos* seems to be a caconym for *Xenus* or *Xinus*. Pierce decides that it should not be emended. When he decides that it should be imitated it is another matter, but a rather usual and not unnatural consequence of the rule against emendation. Saunders had previously invented *Paraxenos* and *Pseudoxenos*. Pierce adds *Halictoxenos*, *Leionotoxenos* and *Vespa Xenos*. He says the latter is derived from *Vespa* and *Xenos*. Since one word is Latin, it does not seem necessary to insist on a Greek ending for the compound. *Vespa Xenos* looks like a caconym for *Vespa Xenus*.

One objection to caconyms is that they lead to personal reflections. One may be very careless in his name-making and very careful in his other biological work, but some people may not think so.

A NEW GEOMETRID GENUS AND NEW SPECIES FROM THE EXTREME SOUTH-WEST.

BY RICHARD F. PEARSALL, BROOKLYN, NEW YORK.

Several years ago, through the generosity of Dr. John B. Smith, I received a box of Geometrid specimens, collected in the Arizona Desert, near Yuma, and at Walters' Station, Calif. It was not difficult to find names for most of these, but the following species have given me some trouble, since this region might well be supposed to harbour occasional Mexican forms. Having this in mind, I have waited an opportunity to study the Schaus collection at Washington, which did not occur until April of this year. In it, so far as I could discover, in all too brief an examination, there is no genus or species to represent one at least of them,

October, 1910

and I have therefore been compelled to erect a new genus—and to name the species as well. The occasion seemed a fitting one to link the names of two of our pioneers in entomology, old and intimate friends since the science was young in this country, and friends of the writer in later years, Edward L. Græf, of Brooklyn, and Dr. John B. Smith, of New Jersey, under the appellation, *Grafia Smithii*, n. sp.

Genus *Grafia*, n. g.

Palpi long, slender, scaled; antennæ bipectinate to apex. Tongue obsolete. Front, thorax and abdomen narrow and smooth scaled. Legs long, slender, with two pairs of spurs on hind tibiæ, no hair pencil. Fore wings: twelve veins, three and four widely separate, six and seven very short-stemmed or separate, with fovea at base. Hind wings: three and four separate, six and seven long-stemmed, eight approximates cell only near base, where there is a small fovea.

The above characters are drawn from the male only, the female being unknown at present. When found she will undoubtedly prove wingless, as in *Coniodes* Hulst, next to which genus this should be placed. It differs as follows: vein five of fore wings normal, vein eight approximates cell only near base, and in the absence of spines on the abdomen—present in both sexes in *Coniodes*.

Type: *Grafia Smithii*, n. sp.—Expanse, 30 mm. Head rather prominent. Front somewhat retreating, rounded. Antennæ long, of a dusky brown, rather loosely bipectinate to apex, not so plumose as in *Coniodes*. Head, thorax and abdomen smooth-scaled, dusky brown, the patagiæ ending with long hair-like scales. All wings broad, the primaries slightly produced at apices, covered thickly with dusky-brown scales; with those are mingled, more or less abundantly, dingy, yellowish scales, and over all a heavy covering of long dusky hairs, appearing as if brushed smooth from base toward apex. Only basal and extradiscal lines are pictured, the former frequently absent, generally as a diffuse, broad, blackish shade, one-fourth out from base at costa, rounding sharply outward, thence with a slight basal incline, to inner margin. Extradiscal similar, sometimes a little blackish, especially at costa, where it starts one-fourth from apex, curving regularly outward to vein seven, thence parallel with outer margin, having a slight basal trend as it nears inner margin. This line is often only a series of blackish diffuse spots on veins. Discal dots are diffuse black, large on primaries, very small on secondaries, the latter being only slightly paler in colour than primaries, with a silken

sheen; hairs less abundant, placed principally along veins and beneath cell. Fringes long, silken, same colour as primaries.

Beneath as above in colour, a shade paler and slightly glossy, the hairs less numerous, chiefly along costal region of primaries. No markings except the diffuse, dusky, discal dot on primaries. Body and legs of the same colour, the fore and middle femora rather heavily clothed with black scales in front.

The type male, one of several taken in April at Walters' Station, Calif., is in the author's collection. Co-types from the same locality will be placed in the Rutgers College collection and the U. S. Nat. Museum. A single co-type recently received from San Diego, Calif., taken April 10th, 1910, is almost worthy of varietal distinction. This example is smaller, only 25 mm. expanse, the wings are more rounded at apices, so thin in texture that the label beneath can be read through them, and the extradiscal line runs closer to discal dot.

(To be continued.)

BASILONA IMPERIALIS DRURY.

On June 26th last, a fine male specimen of this handsome moth was taken by Mr. W. H. G. Garrioch, at an arc light near his residence, on Front street, Hull. He had taken a like specimen a few night previously at the same place. Both specimens were brought to me while they were yet alive, and I have set them up. *As far as I know, these captures of B. imperialis are the first recorded for the Province of Quebec.*

Mr. Arthur Gibson has given me permission to add to this note the following statement: "I, too, have a record of three specimens occurring at the electric light here on the Farm, viz.: on June 22, I saw the upper wing of a specimen lying on the grass, near an electric light; on June 24th a male was taken at the electric light, by one of the working men on the Farm, and brought to me for identification, and, on June 26th, another male was captured on the Farm by another employee."

The Central Experimental Farm is on the Ontario side of the River Ottawa, a few miles from Hull; and, as there is much young pine growing on the banks of the river, it is probable that *B. imperialis* has adopted the neighborhood as one of its habitats.

THOMAS W. FYLES.

Hull, P. Q., July 19th, 1910.

THE ORTHOPTERA OF WESTERN CANADA.

BY THE EDITOR.

(Continued from page 300.)

Subfamily Acridiinae.

64. *Hypochlora alba* (Dodge).MAN.—(Bruner¹.)*65. *Bradynotes expleta* Scudd.?

B. C.—Mount Chéam, 7,000 ft., Aug. 15. (Fletcher.)

This specimen is in bad condition, and I place it doubtfully here. It is, however, a true *Bradynotes*, and the first of this genus to be recorded from Canada.

66. *Podisma nuda* (Walk.).

ALTA.—Banff, 2 ♂'s, 1 ♀. (Sanson.) Also recorded from Laggan by Walker.

B. C.—Sandon. (Walker.) Also recorded as *P. polita* Scudd., from the Kitchener Glacier on Mt. Kokanee by Caudell⁴. Mr. Caudell has kindly sent me for study the single female upon which this record is based, and it seems to differ in no way from *P. nuda*.

This species has been hitherto known as *Asemoplus nudus*, but it is generically distinct from a single female *Asemoplus* in my collection, which Dr. Scudder considered was probably the female of *A. montanus* (Bruner), the type of the genus.

I placed *P. nuda* in *Asemoplus* on Dr. Scudder's authority, but before submitting my specimens to him I had determined the species with very little doubt as *Bradynotes hispida* (Bruner). Some years later my attention was again called to the agreement between my species and the description and figures of *B. hispida* in Scudder's Revision of Melanopli. Prof. Morse then kindly compared co-types of *P. nuda* in the Museum of Comparative Zoology with the two specimens (females) of *B. hispida* there, and found them very closely related if not identical. He also stated that my *P. nuda* did not belong to *Asemoplus*. Mr. Caudell, in a letter to whom I expressed my belief that "*Asemoplus nudus*" was not generically distinct from *Podisma*,

*Small numerals following an authority's name refer to same numerals in the list of references.

replied that he was likewise of the opinion that it was a *Podisma* rather than a *Bradynotes*.

Since the above was written I have seen the specimens of *B. hispida* in the Museum of Comparative Zoology, and believe them to be congeneric, but not conspecific with *P. nuda*.

67. *Podisma Oregonensis* (Thomas).
ALTA.—(Macleod, Scudder⁵.)
68. *Melanoplus Kennicottii* Scudder.
SASK.—Souris River. (Scudder.²) Rudy. (Rehn.)
ALTA.—Slope of Mt. Rundle, near Banff, Sept. 13, 1909, 2 ♂'s;
July 23, 1909, 1 ♀. (Sanson.)
69. *Melanoplus Bruneri* Scudder.
Syn.—*M. Alaskanus* Scudd.
MAN.—Kenville, Swan River District, 1 ♂, 1 ♀. (Alexander.)
SASK.—Langham, 2 ♂'s. (Alexander.) Saskatoon, July, 1906,
1 ♀. (Willing.) Prince Albert, June 6, 1910, 1 ♂. (Fletcher.)
ALTA.—Lloydminster, 5 ♂'s, 1 ♀; Red Deer, 3 ♂'s, 5 ♀'s;
Vermilion, 6 ♂'s, 3 ♀'s. (Alexander.) Banff and vicinity,
July 23, 1909, 2 ♂'s (teneral); July 30, 31, 1908, 2 ♀'s;
Aug. 5, 1908, 2 ♀'s; Aug. 14, 16, 1909, 1 ♂, 6 ♀; Sept. 2,
1909, 1 ♀; Sept. 4, 1908, 1 ♂; Sept. 13, 1909, 2 ♂'s.
(Sanson.) Also recorded from Macleod (Scudder⁶) and Banff
(Scudder⁵, Rehn).

B. C.—Spilmacheen. (Scudder⁵.)

There is some uncertainty of the correctness of the label upon the specimen which I recorded from Vernon, and I doubt if this boreal species occurs there.

All gradations are represented in this series, from typical *Bruneri* to the *Alaskanus* type, in which the apical margin of the subgenital plate is notched in the male. The same variations appear in a series from northern Ontario, although the *Alaskanus* type is apparently commoner in the west. It seems to have no racial or varietal significance.

Specimens of the *Alaskanus* form were received from Langham, Vermilion and Banff. Typical *Bruneri* were also taken at these localities. The specimens from Lloydminster are all about intermediate.

70. *Melanoplus affinis* Scudder.

B. C.—Nicola Valley, Aug. 20, 1901, 1 ♂. (Fletcher.) Also previously recorded from this locality and Vernon by Walker, and from the Province, without further data, by Scudder⁵.

71. *Melanoplus bilituratus* (Walker).

MAN.—Aweme. (Fletcher².)

B. C.—Victoria, Vancouver Id., Sicamous. (Scudder⁵.) Donald, Vernon, Discovery Id., Duncans, Nanaimo and Riddell, Vancouver Id. and Kelowna. (Walker.)

The occurrence of this Pacific Coast species in Manitoba seems improbable, and I feel some doubt as to the correctness of the determination.

72. *Melanoplus atlanis* Riley.

MAN.—Deloraine, June 15, 1901, 1 ♂. (Fletcher.) Aweme, Aug. 14, 1906, 1 ♂. (Criddle.) Winnipeg, Aug. 30, 1909, 1 ♂. (Willing.) Also recorded previously from Winnipeg by Scudder⁵, and from near Rosebank (Walker).

SASK.—Regina, Aug. 23, 1908, 1 ♀. (Willing.) Also recorded from Moose Jaw by Caudell¹ and Walker, and from Parkbeg by Walker.

ALTA.—Metaskiwin, 1 ♀. (Alexander.) North of Olds, Sept. 13, 1902, 3 ♂'s, 1 ♀. Walsh,* Aug. 23, 1901, 2 ♂'s, 1 ♀. (Willing.) Bankhead, Sept. 11, 1908, 1 ♂, 1 ♀. Banff, Aug. 5, 11, 1908, 3 ♀'s; Aug. 6, 16, 1909, 1 ♂, 1 ♀; Sept. 11, 1908, 1 ♂, 1 ♀; Sept. 13, 1909, 1 ♀. Tunnel Mt. Flats, Sept. 3, 14, 1908, 2 ♀'s; Sept. 1, 1909, 1 ♀. (Sanson.) Also recorded from Macleod, Calgary, Banff and Laggan by Scudder⁵, and Kamanaskis and Banff by Walker.

B. C.—Cranbrook, 1 ♀; Nelson, 6 ♂'s, 4 ♀'s; Greenwood, 2 ♂'s; Kamloops, 6 ♂'s, 3 ♀'s. (Alexander.) Kelowna, Aug. 23, 1901, 1 ♂. (Fletcher.) Also recorded from Vancouver by Scudder (Rep. U. S. Ent. Com., 11, App., 24, 1880), Agassiz and Vernon by Walker, Kaslo by Caudell⁴, and Beavermouth by Rehn.

Very great variation is seen in this series. The specimens from Kamloops, except one female, some of those from Banff, and a pair from Olds, are much above the average size, being as large or nearly so, as *M. spretis*. Specimens previously recorded

*Previous references to Olds, Walsh, Leduc and Medicine Hat were placed by error in the Saskatchewan lists.

from Vernon are equally large. One very large female from Kamloops has yellow streaks along the lateral carinæ like those commonly present in *M. Bruneri*. In a very large male from Olds the tegmina are as long as in *M. spretis*, while in another large one from the same locality they are of ordinary length. In the female from Cranbrook the tegmina do not quite reach the end of the abdomen, and the hind tibiæ are pale green. Green hind tibiæ occur also in specimens from Banff, and in a number from Manitoba, which bear no labels.

73. *Melanoplus spretis* Thomas.

MAN.—The Subpermanent Region, as defined by Riley (Rep. U. S. Ent. Com., I, 1878), extends over the western part of this Province as far as Lakes Manitoba and Winnipegosis. The remainder of the Province as far east as Lake Winnipeg and the Lake of the Woods, is included in the Temporary Region.

SASK.—South of about latitude 53° this Province may be roughly divided into an eastern and a western half, the former belonging to the Subpermanent, the latter to the Permanent Region.

ALTA.—Practically the whole of this Province, to a little north of Edmonton, belongs to the Permanent Region.

B. C.—Greenwood, 1 ♀. (Alexander.) Also recorded from this Province by Bruner (Rep. U. S. Ent. Com., III, 60, 1883).

I have deemed it unnecessary to give a detailed list of localities in the case of this migratory species.

74. *Melanoplus devastator conspicuus* Scudder.

B. C.—Vancouver Id. (Caudell³)

75. *Melanoplus Dawsoni* (Scudder).

MAN.—Aweme, Aug. 15, Oct. 2, 1907, 2 ♂'s. (Criddle.) Also recorded from the Red River (Scudder⁵), Portage la Prairie, Brandon, Carberry, Bergin, and between Souris and Boissevain (Walker).

SASK.—Yellow Grass, 1 ♂, 6 ♀'s. Weyburn, 2 ♂'s, 4 ♀'s. Vonda, 1 ♂. Kuroki, 3 ♂'s, 1 ♀. Condee, 1 ♂, 1 ♀. Langham, 3 ♂'s, 3 ♀'s. Moosomin, 4 ♂'s, 8 ♀'s. Kam-sack, 1 ♂, 4 ♀'s. (Alexander.) Regina, Sept. 7, 1903, 1 ♂. (Willing.) Also recorded from the Souris River (Scudder⁶), Moose Jaw (Caudell¹), Chaplin and Parkbeg (Walker).

ALTA.—Ponoka, 1 ♀; Red Deer, 2 ♂'s; Medicine Hat*, 1 ♂, 1 ♀. (Alexander.) Also recorded from Macleod (Scudder²).

Macropterous specimens (*M. Dawsoni completus* Scudd.), included in the above list, have been received from Aweme (2 ♂'s), Yellow Grass (1 ♀), Moosomin (2 ♀'s), and Weyburn (1 ♀).

76. *Melanoplus Gladstoni* Scudder.

Syn.—*M. compactus* Scudd.

MAN.—Aweme, Aug. 12, 18, 1906, 3 ♂'s, 1 ♀; Aug. 12, 1907, 1 ♀; Aug. 30, 1907, 2 ♂'s, 1 ♀; Oct. 7, 1907, 1 ♂. (Criddle.) Also recorded from between Carberry and Neepawa (Walk.).

SASK.—Regina, Sept. 23, 1906, 1 ♀. (Willing.) Also recorded from Moose Jaw (Caudell³).

ALTA.—Medicine Hat, 6 ♀'s; Macleod, 1 ♀; (Alexander.) The Loop, Banff, Sept. 13, 1909, 1 ♀. Also recorded from Medicine Hat (Scudder⁵, Caudell³) and Calgary (Caudell³).

M. compactus is certainly, and *M. conspersus* probably, a synonym of *M. Gladstoni*.

77. *Melanoplus Washingtonianus* Bruner.

ALTA.—Summit of Sulphur Mt., near Banff, Aug. 23, 1909, 1 ♂, 3 ♀'s; the Loop, Banff, Aug. 16, 1909, 1 ♂, 1 ♀; Tunnel Mt., Sept. 4, 1908, 1 ♀. (Sanson.) Also recorded from Laggan by Caudell³, and from the same locality as *Podisma Dodgei* (?) by Walker.

78. *Melanoplus validus* Scudder.

B. C.—Nelson, 1 ♀. (Alexander.)

This specimen has pale red hind tibiae. The determination was confirmed by Mr. Caudell.

79. *Melanoplus fasciatus* (Walker).

MAN.—Point Wigwam, Lake Winnipeg. (Scudder¹.) Lake of the Woods. (Caulfield.)

SASK.—Kinistino, June 23, 1905, 2 ♀'s. (Willing.) Also recorded from the Pas, Saskatchewan River (Scudder¹) and the Souris River (Scudder²).

ALTA.—Banff, Aug. 5, 8, 22, 29, 1908, 1 ♂, 4 ♀'s; Aug. 11, 16, 1909, 1 ♂, 2 ♀'s; Sept. 13, 1909, 3 ♀'s. Slope of Mt. Rundle, Sept. 13, 1909, 1 ♂. Tunnel Mt., Sept. 4, Oct. 3,

1908, 2 ♀'s. Summit of Sulphur Mt., Aug. 21, 31, 1908, 2 ♀'s; Aug. 23, 1909, 1 ♀. Mt. Inglesmaldie, 6,000 to 7,000 ft., Sept. 11, 1908, 1 ♂, 3 ♀'s. (Sansou.) Also recorded from Laggan (Scudder⁵), Banff (Walker), and Edmonton (Fletcher²).

The only record of the macropterous form is the one from Edmonton. This form is common in northern Ontario.

80. *Melanoplus femur-rubrum* (De Geer).

MAN.—Winnipeg. (Scudder⁵) Portage la Prairie and Brandon. (Walker.)

SASK.—Condee, 1 ♂; Findlater, 2 ♀'s; Pasqua, 1 ♂; Weyburn, 2 ♀'s. (Alexander.) Also recorded from Moose Jaw and Waldeck (Walker).

ALTA.—Ponoka, 1 ♀. (Alexander.) Walsh, Aug. 23, 1901, 3 ♂'s, 2 ♀'s. (Willing.) Also recorded from Medicine Hat (Caudell³).

B. C.—(Bruner¹, Scudder⁵.) Vancouver Id. (Scudder⁵.) Agassiz. (Walker.) Kaslo. (Caudell⁴.)

The specimens from the drier parts of Saskatchewan are considerably below the medium size.

81. *Melanoplus extremus* (Walker).

MAN.—Aweme, June 20, 1905, 1 ♂. (Criddle.) Also recorded from Plum Coulee (Walker) and Aweme (Fletcher²).

SASK.—Kinistino, June 23, 1905, 1 ♂, 1 ♀ (teneral). (Willing.)

ALTA.—Banff, July 22, 31, 1908, 2 ♂'s; Aug. 5, 28, 29, 1908, 4 ♂'s, 3 ♀'s. (Sansou.) Also recorded from Beaver Lake (Fletcher²) and Banff (Scudder⁵).

B. C.—Field. (Rehn.)

The only macropterous individuals in the series are two males from Banff.

82. *Melanoplus monticola* Bruner.

ALTA.—Mountains near Laggan. (Caudell³.)

83. *Melanoplus angustipennis* (Dodge).

MAN.—Aweme, July 19, 1904, 1 ♂; July 29, 1906, 1 ♀;

Aug. 12, 1905, 1 ♂; Aug. 18, 1906, 1 ♂; Aug. 23, 1904, 1 ♂;

Oct. 6, 1907, 1 ♂. (Criddle.)

The specimen taken Aug. 18, 1906, has blue hind tibiae, the others red. The red-legged individuals, commonly known as *M. coccineipes*, are certainly not distinct from the typical blue-legged form.

The specimens in this series are all of small size. Two of them are of an almost uniform pale reddish-brown colour.

84. *Melanoplus Packardii* Scudder.

SASK.—Regina (Caulfield), Moose Jaw (Caudell³), and Radisson (Rehn).

ALTA.—Medicine Hat, 4 ♀'s (Alexander); Oct. 1, 1903, 2 ♂'s, 2 ♀'s (Willing). Also recorded from Calgary (Caudell³).

B. C.—(Scudder⁵.) Nicola Valley. (Walker.)

85. *Melanoplus fædus* Scudder.

SASK.—Swift Current Creek, Aug. 5, 1901, 1 ♀. (Willing.)

86. *Melanoplus infantilis* Scudder.

MAN.—Between Souris and Boissevain, and Brandon. (Walker.)

SASK.—Kamsack, 1 ♂. Weyburn, 4 ♂'s. Yellow Grass, 3 ♂'s (Alexander.) Regina, Sept. 15, 1901, 1 ♂; Sept. 23, 1906, 2 ♀'s. Also recorded from Regina (Caulfield), Moose Jaw (Walker, Caudell^{1,3}), vicinity of Chaplin and Parkbeg, Indian Head, and near Waldeck (Walker) and Rudy (Rehn).

ALTA.—Leduc, July 23, 1901, 1 ♂. Walsh, Aug. 23, 1901, 4 ♂'s, 1 ♀. (Willing.) Lethbridge, 1 ♂. Medicine Hat, 2 ♀'s. (Alexander.) Also recorded from Macleod (Scudder⁵), Calgary (Caudell³).

87. *Melanoplus minor* (Scudder).

MAN.—Aweme, June 21, 28, 1904, 2 ♂'s. (Criddle.) Also reported from Winnipeg by Scudder⁵.

SASK.—Rudy. (Rehn.)

88. *Melanoplus bivittatus* (Say).

MAN.—Bonito, Swan River District, Sept. 8, 1906, 1 ♀. Near Durham, Swan River District, 3 ♂'s. (Alexander.) Also recorded from Winnipeg and Lake Winnipeg (Scudder⁵), Lake of the Woods (Scudder⁵), and near Rosebank (Walker).

SASK.—Moosomin, 1 ♂. Condee, 1 ♀. Weyburn, 1 ♂. (Alexander.) Regina, Aug. 12, 1901, 1 ♀; Aug. 12, 1904, 1 ♀; Sept. 10, 1905, 1 ♂; Sept. 7, 1903, 1 ♂ nymph. Swift Current, Sept. 17, 1 nymph. Radisson, July 29, 1907, 1 ♀. (Willing.) Also recorded from Rush Lake (Walker), Moose Jaw (Caudell³), Rudy and Radisson (Rehn).

- ALTA.—Ponoka, 5 ♂'s, 11 ♀'s. Calgary, 1 ♀. (Alexander.)
Walsh, Aug. 23, 1901, 1 ♀. North of Olds, Sept. 13, 1902,
1 ♀. (Willing.) Also recorded from the Souris River
(Scudder⁹), Medicine Hat and Macleod (Scudder⁹),
B. C.—(Bruner, Rep. U. S. Ent. Com., iii, 1883.) Victoria
(Fletcher¹) and Vernon (Walker).

The only records of the red-legged form (*femoratus*) are from Lake Winnipeg, Calgary, Vancouver Id. and British Columbia. Both forms are recorded from Lake Winnipeg, Calgary and British Columbia.

89. *Phataliotes Nebrascensis* (Thomas).

ALTA.—Walsh, Aug. 23, 1901, 1 ♀, brachypterous. Also recorded from Medicine Hat and Macleod (Scudder⁹).

90. *Asemoplus Montanus* (Bruner).

B. C.—Nelson, 1 ♀. (Alexander.) Also recorded from Vernon by Walker.

NOTONECTA UNDULATA SAY PREYING ON THE EGGS OF
BELOSTOMA (= *ZAITHA* AUCTT.) *FLUMINEUM* SAY.

BY HENRY H. P. SEVERIN AND HARRY C. SEVERIN.

A few undulating back-swimmers, *Notonecta undulata*, were placed as food material in a glass-jar of water containing a male specimen of *Belostoma flumineum* bearing eggs on its back. Several days later it was observed that the only surviving *Notonecta* was feeding in a righted position on the eggs, while the *Belostoma* was clinging quietly, back upward, to an object on the bottom of the jar. The back-swimmer was disturbed several times at its meal, but after swimming about for a short while it would again return to feed on the eggs. The interesting point of the observation was, that during the entire process of feeding, the *Notonecta* was always in a righted position.

THE Annual Meeting of the Entomological Society of Ontario will be held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 3rd and 4th.

NEW PARASITES OF THE GENUS MERAPORUS.

BY E. S. TUCKER,

Bureau of Entomology, U. S. Dept. of Agric.

In a small quantity of seed wheat obtained from the storehouse of a grain dealer at Plano, Texas, in July, 1907, two dead bodies of a Chalcid fly were found, together with a few specimens of the common grain weevil, *Calandra oryzae* L. These parasites were found to agree closely, but still doubtfully, with *Meraporus calandrae*, described as a *Pteromalus* by Dr. L. O. Howard in the Annual Report of the (U. S.) Commissioner of Agriculture for 1880, p. 273. On submitting the specimens to Mr. J. C. Crawford, at the U. S. National Museum, he reported that they belonged to the genus *Meraporus*, though the species was not *calandrae*. My parasite thus appeared to be undescribed, and it was consequently cited as a new species by Mr. W. D. Pierce in his paper entitled, "A List of Parasites Known to Attack American Rhynchophora" (Jr. Econ. Ent., I, Dec., 1908, p. 384).

The species is herewith described; type and paratype as mentioned are deposited in the U. S. National Museum.

Meraporus utilis, n. sp.

Female: Length, 1.5 mm.; head, thorax and abdomen steely black, clothed with extremely fine and sparse silvery pubescence, except on base of abdomen, and minute black bristles on occiput and dorsum of thorax; reticulately punctured on head, confusedly so on thorax; abdomen smooth-shining, venter strongly keel-shaped. Head transverse, wider than thorax, front slightly depressed medially for reception of antennal scapes, below with convergent striæ at oral margin; antennæ about as long as thorax, dull reddish, pedicel and flagellum, excepting first and second ring-joints, darkened above; ring-joints together about two-thirds the length of pedicel, first and second ring-joints small, but combined equal to length of third, which is slightly smaller than first funicular joint, the latter a little longer than wide, second to fifth funicular joints quadrate; club with widest expansion at juncture of first and second joints, tapering to a conical point with third joint. Ocelli arranged in a curve.

Thorax a little longer than wide, parapsidal furrows indistinct; metathorax punctured as on dorsum, tricarinate, the median carina short, the lateral ones sinuate and extending to posterior corner of the short metathoracic neck; lateral folds indicated by basal foveolæ only, spiracles very small, broadly oval; spiracular sulci very deep and distinct,

Tegulae fulvous; wing-veins yellow, ciliate, stigmal vein scarcely two-thirds the length of marginal or postmarginal; legs yellow, excepting coxae and last tarsal joint outwardly, which are black, the femora, tibiae and tarsi about equal in length for each pair, the fore legs short in proportion with others.

Dissection of the mandibles of the paratype has shown each one to have four denticles, colour ferruginous with front edges darker.

Before attempting the above description, efforts were made to obtain a series of specimens representing both sexes, but all the other specimens obtained failed to agree with my first species. The additional specimens were not secured until the season of 1909, when a quantity of cracked corn and oats infested primarily by *Calandra oryzae* was obtained July 26, from the same grain house at Plano, Texas, where my first examples had been taken. This mixed grain had been gathered from scatterings on the floor, under the shelling and cleaning machinery, where it had lain for probably a month before being sacked and set aside for sale as chicken feed. The infested grain was placed in breeding crocks at Dallas, Texas, and adult parasites appeared within four days, further emergences occurring August 6, 7 and 9, September 11, October 16 and 18, November 23, December 16, and again on April 5, 1910, and at various times since. Although I had collected weevily grain from other sources in the hope of rearing this or the first species, only one female had been thus secured, and this specimen matured October 3, 1908, from an ear of corn infested by *Calandra oryzae*, which had been collected by myself ten days previously in a field near Shreveport, La. The species agreed with those of my second collection from Plano, Texas, and the record is important for proof of the occurrence of the parasite in fields where the host abounds, though, as might be expected, stored grain when infested by weevils naturally becomes a place of concentration of the enemy as with the host.

At the time my specimens were being studied, still other examples, comprising five females and one male reared from rice primarily infested by *Calandra oryzae*, which material was obtained by Mr. D. L. Van Dine in a rice mill at Welsh, La., August 2, 1909, were discovered to be identically the same parasite. The species is consequently named in honour of Mr. D. L. Van Dine, who furthermore submitted still other identical specimens which he had collected in similarly infested rice, and also on windows in rice mills at El Campo, Texas, June 22, and at Lake Arthur, La., July 29. His records add materially to a knowledge of the importance of the parasite and its distribution. These specimens are

included under the designation of paratypes for the following description, which is based on an examination of 40 females and 5 males. Types are deposited in the U. S. National Museum.

Meraporus Vandinei, n. sp.

Female: Head and thorax dark greenish, clothed with thin and fine silvery pubescence, a thick linear patch on each side of the metathorax; abdomen smooth, shining greenish, thinly pubescent on apical segments, venter deeply keeled; head transverse, somewhat wider than thorax, finely reticulated rather than punctured on occiput, front and cheeks, with convergent striæ at oral margin of middle face; front above insertion of antennæ hollowed for reception of scapes; mouth-parts ferruginous, each mandible with four denticles; antennæ about as long as thorax, scape dull reddish; flagellum dull reddish beneath, darker above, with fine silvery pubescence; pedicel about twice the length of the three ring-joints together, but scarcely longer than the first funicle-joint, which appears distinctly longer than wide; second and third funicle-joints slightly longer than wide, fourth and fifth quadrate; club expanded at junction of first and second joints, the third forming a small conical tip. Anterior ocellus situated but little in advance of a median point between the posterior ones.

Thorax with fine shallow thimble-pitted punctures, contiguous and distinctly larger than on head; length of thorax scarcely exceeds the width, parapsidal furrows very faint only on anterior half of mesonotum. Metathorax very finely punctured, with a median longitudinal carina; metathoracic neck very short, smooth; lateral folds indicated by basal foveolæ only, spiracles very small, broadly oval; spiracular sulci very deep and distinct.

Tegulæ fulvous; wing-veins yellow, ciliate, stigmal vein shorter than marginal or postmarginal by about one-fourth the length. Legs yellow, excepting the coxæ, femora in greater part between the base and apex, and last tarsal joint outwardly, which are dark brown or fuliginous. Tibiæ of middle and posterior legs little longer than femora or tarsi, which are about equal in length, but no noticeable difference in these respects with fore legs. Comparatively the fore legs are shorter than the others.

Type: Plano, Texas, July 26, 1909; emerged September 11.

Male: Antennæ with larger microscopical pits than with female; the first and second ring joints very small and compressed, the third appears as the first joint of funicle, but is smaller and shorter than the true funicular joints. Abdomen hardly as long, or at most not longer than

thorax, almost flattened above, not deeply keeled ventrally, widest near apex, and with a dorsal fulvous area near base expanding to the lateral edges; otherwise agreeing with females.

Type: Plano, Texas, July 26, 1909; emerged August 6.

Paratypes show some variations of colour; the greenish tinge of head and thorax being stronger in some examples than others, and the flagellum is sometimes nearly or wholly black.

Length of female type and paratypes ranges from 1.25 to 2 mm.; male type and paratypes from 1 mm. to 1.5 mm.

A single specimen reared with *Vandinei* from same material collected by Mr. D. L. Van Dine at Welsh, La., August 2, 1909, represented another species, which is described as follows:

Meraporus requisitus, n. sp.

Male: Length, 1.25 mm.; resembling *Vandinei* and similarly punctured, but distinguished by blacker colour of body, and paler legs, including fore coxæ, the femora only dull brown; no metathoracic carina, nor fulvous area on base of abdomen; first and second funicle-joints little longer than wide, third to fifth subquadrate; left mandible with three denticles, but four on the right.

The genus *Meraporus*, as established by Francis Walker (Monographia Chalciditum, Ent. Mag., v. 2, 1834, p. 298), was accorded 12 antennal joints, but in Ashmead's classification, it is considered as having 13 joints of the antennæ. Walker very likely failed to distinguish more than two ring-joints. In fact, the entire three ring-joints, particularly of male examples, are difficult objects for clear definition even under a binocular with high power magnification.

Three previously described species of *Meraporus* have been recognized in the United States: *calandra* How., has an asymmetrical denticulation, the right mandible with four denticles, and the left with three; *bruchivorus* Ashm., is readily known by the smooth lower face and cheeks, besides larger size; and *dubius* Ashm., although characterized by a tricarinate metanotum, is said to have strongly curved lateral folds, and subcosta nearly three times as long as the marginal vein.

The very helpful assistance of Mr. J. C. Crawford in the study of my specimens is gratefully acknowledged.

ECONOMIC LITERATURE CONSULTED.

1. Ashmead, W. H.—Descriptions of new parasitic Hymenoptera bred by Prof. F. M. Webster. (Ohio Agr. Exp. Sta., Bull., Tech. Ser., v. 1, No. 3, April, 1893, p. 161.)

- Descriptions of *Neraporus bruchivorus*, reared from *Larva (Bruchus)* sp. in Kansas, and *Larva (Bruchus) exiguus*, in Iowa.
2. Chittenden, F. H.—A foreign parasite of the grain weevils. (U. S. Dept. Agr., Div. Ent., Bull. 8, n. s., 1897, pp. 43-45.)
Refers to *Pteromalus calandrae* How.
 3. Cotes, E. C.—A conspectus of the insects which affect crops in India. (Ind. Mus. Notes, v. 2, No. 6, 1893, p. 155.)
“*Pteromalus oryzae* Cameron.—A minute coppery-green coloured insect, believed to be parasitic upon the wheat and rice weevil (*Calandra oryzae*).”
 4. Doten, S. B.—Department of Entomology. (Nev. Agr. Exp. Sta., Bull. 66 [An. Rept. for year ending June 30, 1908], Dec., 1908, p. 36.)
Reports *Meraporus?* sp. reared from larvæ of the codling moth.
 5. Fernald, C. H.—Report on insects. (Hatch Exp. Sta. Mass. Agr. Coll., Bull. 19, May, 1892, p. 116.)
Mentions an undescribed species of *Meraporus* bred from pupæ of Gypsy moth. See correction in 7.
 6. Fernald, C. H.—Entomologist's report. (Fortieth An. Rept. Mass. St. Bd. Agr., 1892 [1893], p. 297.)
Cites *Meraporus* sp.? from Gypsy moth pupæ. See correction in 7.
 7. Fernald, C. H.—Entomologist's report. (Forty-second An. Rept. Mass. St. Bd. Agr., 1894 [1895], p. 261.)
Corrects the determination of species formerly cited as *Meraporus* sp.? which proved to be *Diglochis omnivorus* Wk.
 8. Howard, L. O.—See reference in text. Description and breeding records of *Meraporus (Pteromalus) calandrae*.
 9. Pierce, W. D.—See reference in text.
 10. Riley, C. V., and Howard, L. O.—Special notes. (Insect Life, v. 4, Nos. 11 and 12, Aug., 1892, p. 354.)
In review of Bull. 19, Hatch Exp. Sta. Mass. Agr. Coll., an undescribed species of *Meraporus* is mentioned as issuing from the pupa of the Gypsy moth. See correction in 7.
 11. Riley, C. V.—The insects occurring in the foreign exhibits of the World's Columbian Exposition. (Insect Life, v. 6, No. 3, Feb., 1894, p. 223.)
Cites *Meraporus* (?) sp. in sheaf grain, “badly infested with *Gelechia cerealella*”; another species recorded as “parasite of *Bruchus 4-maculatus* from Brazil”; one other species at large.

12. Smith, J. B., and Ashmead, W. H. Order Hymenoptera. Insects of New Jersey. (Supp. 27th An. Rept. St. Bd. Agr. N. J., 1899 [1900], p. 558.)

Cites *Meraporus calandrae* How. "Should occur in New Jersey."

A NEW SPECIES OF JAPANESE MICRO-LEPIDOPTERA.

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

A pair of specimens of the species herewith described were sent to me by Dr. John B. Smith, the latter part of May, with the statement that they had been bred from larvæ found on young hemlock trees, recently imported from Japan by a nurseryman in this State. As the species was unknown to me and of a distinctly Oriental appearance, I sent a male to Dr. Edward Meyrick, Marlborough, England, the authority on Eastern Lepidoptera. Dr. Meyrick was good enough to make a prompt reply, stating that the species was undoubtedly referable to his genus *Ptochoryctis*, of which he has already described five others, all from Indian regions, and that the nearest allied genera, *Methathrinca* and *Linoclostis*, are also only known from India and the Malay Archipelago, hence he did not doubt that this species is truly Japanese. Dr. Meyrick also stated that the species nearest to it is *P. simbleuta* Meyr., the larvæ of which are brick-red, and feed beneath a web, covered with refuse and pieces of bark, on bark and shoots of tea-plants (*Thea*), eating right through to the cambium, and thus killing the branch or plant. (Journal Bombay Natl. Hist. Soc., XVIII, 150, 1907.)

This letter was duly communicated to Dr. Smith, and he was good enough to forward fourteen other specimens, together with notes, larvæ, cocoons or cases and pupal shells, from all which the following description was made:

The larvæ were taken April 5th, in cocoons or larval-cases, larvæ all alive at this date, first pupa observed May 4th.

My belief is that the cocoons in which the larvæ pupated are larval-cases, making the habit similar to *P. simbleuta*. The case is of rather tough silk, thickly covered with pellets of dried frass, hemlock-needles and other refuse, lightly fastened to the twigs and apparently fairly well concealed in a cluster of needles. The cases are 10-15 mm. long, by 5-6 mm. in diameter. Pupal shell remains within the case when moth emerges.

As it is quite possible that other shipments of hemlock from Japan may be infested with this species, it might be well for State entomologists and nurserymen to be on the lookout for its appearance. The moth is

not unlike *Crambus elegans*, and of the general appearance of *Stenomastix schlagerei* and some of the whitish *Ethmias*. If it can readily be controlled it would be a very interesting and handsome addition to our fauna.

Family XYLORYCTIDÆ.

Genus PTOCHORYCTIS Meyrick.

Trans. Ent. Soc. London, p. 19, 1894.

"Head with appressed scales, side-tufts loosely spreading; ocelli present; tongue developed. Antennæ $\frac{3}{4}$, in male bipectinated, towards apex simple, basal joint stout, without pecten. Labial palpi long, curved, ascending, with appressed scales, terminal joint shorter than second, acute. Maxillary palpi rudimentary. Posterior tibiæ clothed with long hairs.

Fore wings with vein 1b furcate, 2 from 4/5, 7 and 8 stalked, 7 to hind margin, 9 absent, 11 from beyond middle.

Hind wing 1, trapezoidal-ovate, hind margin sinuate, cilia $\frac{1}{2}$, veins 3 and 4 short stalked, 6 and 7 approximated towards base.

Nearly allied to *Cryptophasa*.

Type of genus and only species described in this paper, *P. eremopa* Meyrick.

Habitat.—Koni, Upper Burma."

Ptochoryctis tsugensis, new sp.—♂-♀. Expanse, 21-24 mm.

Head, thorax and labial palpi cream-white, latter dusted with fuscous at base; stalk of male antennæ cream-white, narrowly fuscous between joints; pectinations fuscous, basal joint shining greenish-fuscous; female shining fuscous, faintly annulated with white. Abdomen cream-white, posterior upper half of each male segment cupreous; legs cream-white, first pair heavily overlaid with shining fuscous, middle pair heavily dusted with fuscous on tibiæ and tarsi, posterior pair but lightly speckled, spurs all dusted, heaviest at apices.

Fore wing shining white, marked with fuscous as follows: Over upper vein of cell, from just beyond base to end of cell and continuing over vein 6 with branches 7 and 8, with a faint scattering of dark scales over 10 and 11. The lower vein of cell, from middle, is heavily overlaid with the dark colour, spreading over veins 2 to 5, the interspaces being more or less white. Vein 1b from beyond base to tornus. The extreme base of wing is pure white, except costa, narrowly edged with fuscous to inner $\frac{1}{3}$. A dark subterminal line begins at outer sixth of costa, curves outward to vein 6, thence inward to tornus, paralleling margin, over each vein the colour is darker. Between this and cilia the terminal space is

overlaid with a lighter shade of cupreous-fuscous, forming a continuous terminal line, but inward interrupted by white spots between the veins. Cilia white at base, through which runs a fine dark line, outwardly lighter shining fuscous.

Hind wing whitish-yellow, cilia white, with faint median line; under side fore wing shining light fuscous, slightly darker over veins; hind wing yellowish gray, slightly darker over veins 7 and 8.

Variation: Description is from average specimens; the amount of dark scaling is not uniform, in some specimens the dusting is much heavier, nearly filling the interspaces, especially beyond and below cell, in others the dark scales are absent, except on the veins, but in all the pattern is maintained as per the description.

Described from 8 males and 8 females bred from larvæ on a Japanese species of hemlock, *Tsuga sieboldi*, at a nursery in New Jersey; issued May 7 to 23. A pair of co types deposited in U. S. Natl. Mus., N. J. Agric. Exp. Sta., Meyrick collection, the balance in Kearfott collection.

Larva full-grown, from alcoholic specimen.

Fourteen mm. long, 2.5 mm. diam. at 1st abdominal segment. Cylindrical, slightly tapering from 1st abd. to anal segment. Head blackish-brown, flattened in front, rather square on top; clypeus triangular, reaching only half way to vertex; epistoma paler; antenna concolorous. Prothoracic shield large, concolorous with head, bisected by paler dorsal line, two tubercular plates below large and brown. Body cream-white, speckled with pink, the pink specks are in a double dorsal line, a subdorsal line, a subspiracular line and a line above the feet, also a less distinctly defined ventral line. The subdorsal line is darker and better defined than the others. Tubercles prominent, pinkish-brown. Setæ moderate, pale. Anal shield large, yellow, speckled lightly with pale brown. Thoracic feet blackish-brown, annulated with whitish; abdominal feet moderate, normal, the crochets in complete ellipse.

Pupa, 8 x 2 mm., slightly flattened, light brown, darker on dorsum. Frontal shield similar to Tortricid pupa. Cremaster broad laterally, with two outer and two middle very short hooks.

Examples of this larvæ were submitted to Prof. W. T. M. Forbes, who has written description which will follow. In a letter, Mr. Forbes states:

"The caterpillar shows some curious likenesses to *Endrosis lacteella*, such as the form of the front and surrounding parts. There seems to be also a suggestion of the curious slit-like marks on the labium. On the other hand, the setæ on the prolegs are unique, so far as I have seen, and so is the double ring of tubercle iii. Can it use setæ iii in travelling, and so need a more complex joint for them than other caterpillars have?"