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FURTHER NOTES ON ALBERTA LEPIDOPTERA, WITH DESCRIPTION OF A NEW SPECIES.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

(Continued from page 34.)

326. *Anarta cordigera* Thunb.—Didsbury, June 11th, 1906; C. G. Garrett.

327. *A. melanopa* Thunb.—Common 'n the mountains, from just below imber line upwards. Middle July and Aug.

328. *A.*, sp.—This cannot be *quadrilunata* of which I have seen the type from Colorado in the British Museum, and have a similar specimen from the same state. The on!y other specimen of No. 328 that I have seen is the ♀ before mentioned in Prof. Smith's collection, !abelled July 25th, 1889.

329. *A. zetterstedtii* Stand.—Sir George Hampson in CAN. ENT., XL., 104, refers this form to *Sympistis zetterstedtii* Staud., recording a male and female taken by Mrs. Nicholl, on Mt. Athabasca, Alta., and Kicking Horse Pass, B. C. The species occurs in Northern Europe. The form is extremely near *lapponica*, and there are Labrador specimens under both names in the British Museum.

330. *A. zetterstedtii*, var. *labradoris* Stand.—This form so stands in the British Museum, but under *Sympistis*. I suspect it of being distinct from No. 329, but have only one specimen of the latter.

331. *Nephelodes tertialis* Smith,=*emmedonia* Cram.—In Ent. News, XXII., 397–401, I published some notes on this genus, and expressed the opinion that the Pacific coast *pectinatus* was possibly distinct, and at any rate recognizable as a variety. On the other hand *tertialis* does not seem in any way separable from eastern *minians*, to which *emmedonia* is merely a prior name.

333. *Leucania minorata* Smith,=*luteopallens* Smith,=*pallens* Linn.—*Minorata* was described in 1894 from California and Oregon, and compared with *oxygala* Grt.; "Smaller throughout, the ground

colour reddish, the secondaries darker." I have seen the type of *oxygala* Grt. (not *oxygale*) from Colorado, in the British Museum. It is a very smoky thing, with secondaries wholly dark, in fact darker than the types of *minorata*, or anything of this series that I have elsewhere seen. Sir George Hampson's figure of it is poor and misleading. The note I took the first time I saw the specimen was, "Sugges s a melanic *minorata*. Suspiciously like European *fulig nosa* (*impura*)." I noted on my next visit, however, that it was not the same as *fuliginosa*. Having seen nothing else quite like it, I must for the present let it stand as possibly a good species, but feel quite satisfied that nearly all the references of Smith and Dyar to *oxygala* really refer to *minorata*. I have only two specimens from California, which agree with Smith's figure and description of the latter, except that they cannot be called reddish. They certainly might easily be confused with *fuliginosa*, but are not as dark as type *oxygala*, though more uniform smoky than the rest of my series.

In his "Revision of Leucania" Smith claims that the eastern North American form previously known as *pallens* is distinct from that European species, and describes it as *luteopallens* on somewhat indefinite characters, emphasizing, however, a difference in the genitalia. He there includes the Alberta and B. C. races under *minorata*, and says; "It stands between *oxygala* and the European *pallens*, being really the American representative of the latter species." Hampson refers *luteopallens* as a synonym of *pallens*, placing it in a group in the tables, "Fore wing without fuscous shade below median nervure," and holds *minorata* as distinct, and having "fore wing with fuscous shade below median nervure." I could not see that this character held good in the British Museum series, and it seems to be a variable feature all over this continent. The most justifiable separation in the group would seem to be between the European *pallens* and our new world form. In most European specimens the longitudinal strigation is similar, and shading evenly distributed all over the primaries. In none of my specimens i there an obviously darker shade below he median vein, though such a variation is mentioned by Tutt in "British Noctuæ and their Varieties," Vol. I., p. 42, under the name *suffusa*. In American specimens the region of the cell and of the submedian interspace is frequently somewhat paler than the rest of the wing, and a smoky streak is usual above vein 5. Alberta and California specimens are the darkest in my series, especially as to secondaries, but the variation overlaps, and my most European-like examples are from Vancouver Island. The secondaries vary similarly on both continents, and Mr. G. Chagnon, of Montreal, has exactly duplicated genitalia from both sides of the Atlantic. A pink variation is locally common in England, and it is probable that *rubripallens* Smith will prove to be the corresponding variety with us, but I am not yet sufficiently familiar with this to be able to form a definite opinion.

334, 335. *L. albilinea* Hübn,=*diffusa* Walker.—I have taken specimens here which connect the two series I had previously separated, and agree with Hampson in uniting the names. Walker's type is a female from Nova Scotia. Hampson also includes *obscurior*, *tetera* and *neptis* as synonyms, with which I agree, and would add *limitata* Smith.

336. *L. dia* Grt.=*heterodoxa* Smith.

336a. *L. dia* Grt. var. *megadia* Smith.—I have examined the type of *dia* Grt. in the British Museum, which, according to the catalogue comes from California, and some Calgary specimens are exactly like it. The male and female type *heterodoxa* are from the Sierra Nevada. *Megadia* will stand for that variation with a black basal streak, merely an evanescent character. A Calgary cotype of *megadia* is in the British Museum, and is correctly referred as a synonym of *dia* by Hampson. His reference of *heterodoxa* to *insueta* is based on a Minnesota specimen sent him by Smith. Whether this is the Minnesota example mentioned in Smith's description, of course I cannot be sure. Sir George Hampson's reference of the specimen to *insueta* appears to me correct, though it is unusually pale, and certainly very like some western *dia*. My knowledge of *insueta* is at present rather limited, but those I have from eastern localities suggest dark streaky *dia* with a rufous tinge, and not always a very pronounced one either. I quite expect that *insueta* will ultimately prove to be the same.

337. *L. multilinea* Walker.—I consider this form correctly named. I have a series from Vancouver Island. Besides the Calgary cotype of *anteroclara* Smith, previously referred to, a female

cotype of that from Vancouver, in the Rutgers College collection, is also *multilinea*.

339. *L. ant roclara* Smith.

340. *L. an'eroclara*, var. *calgariana* Smith.—I am convinced of the distinctness of *anteroclara* from *phragmitidicola*, though confusion with that species is certainly easy. *Calgariana* is pretty obviously a reddish variation of *anteroclara*, and bears the same relation to it as *roseola* does to *farcta*. But whether *anteroclara* is really distinct from *farcta* is another matter. *Farcta* was described from California, and I have a good series from Oakland. It is paler and more even, with median vein less contrastingly whitish, and has pure white secondaries. As a rule they may be separated also by the presence o' a dark shading below the median vein in *anteroclara*, but this does not always exist. I strongly suspect *anteroclara* of being a dark race of *farcta*, but so closely do species of Leucania sometimes resemble one another that I dare not risk the reference at present. I have very rarely seen true *anter clara* from west of the Rockies, but have compared and so named a single Kaslo specimen for Mr. Cockle.

Roseola was described from a single specimen from B. C., as a variety of *farcta*, but was subsequently treated by its own and all other authors as a species. It is common on Vancouver Island, and also at Kaslo, and occasional specimens, generally females, have dusky shading on secondaries. But without the pink coloration they are *farcta* exactly, and I see no reason for separating them. I have Kaslo specimens, and have compared others, so dark and streaky as to make separation from Calgary specimens of *calgariana* almost impossible, and have so named one for Mr. Cockle, but must for the present allow the names the benefit of the doubt.

341. *Himella contrahens* Walker, = *quadristigma* Smith, = *infidelis* Dyar.—I have six specimens from the Red Deer River, one from Lethbridge, Alta., and others from Regina, Sask., and Cartwright, Man. These show exactly similar variation to a Kaslo series, which are typical *infidelis*. A long series from Stockton and Provo, Utah, are similar, but run to a darker and more suffused form, one of which I have compared with Grote's type of *contrahens* from Nova Scotia, in the British Museum, and believe it to be the same.

Grote mentions after his description that he had found a specimen in the collection of the Canadian Entomological Society labelled "*Celæna contrahens* by Walker. This was presumably Walker's type. I have seen a male and female type of Morrison's *thecata*, from New Hampshire, in the Strecker collection, and they are the same species, as already referred by Smith and others. I do not feel quite sure that *conar* is the same species. It was described from "New Mexico, near the borders of Chihuahua". My notes on the type say that it is "almost flesh-coloured, faintly pink, and not reddish or brown." I have seen nothing else quite like it, and must for the present leave it alone. Hampson's figure under the name *conar* is *contrahens*, or more exactly the paler *infidelis* from Nebraska. The types of *quadristigma*, from Bluff, Utah, and Santa Rita Mts., Ariz., are paler still, and have less of the black suffusion usually found in more northern specimens. I might add that Strecker's description of *conar* says the colour is "very light silky grey, or ashen." Though this could scarcely be translated into "pinkish," as the specimen looked to me, still it is not the way I should describe any *contrahens* in my collection

343. *Tæniocampa malora* Smith,= *hibisci* Guen.—In Vol. XLII., p. 190, June, 1910, I published a note on *hibisci*, pointing out that *alia* was prior to *suffusca*, and citing the B. C. form, previously known as *pacifica*, as a local race of *hibisci* under the new name *latirena*, of which I called *quinquefasciata* a variation. On page 317, (October), Smith admitted the distinctness of *pacifica*, eliminated the name *latirena* as valueless, and made *hibisci* Guen.= *confluens* Morr., and a variety of *instabilis* Fitch. He also reinstated his *quinquefasciata* as a species, and created six more to keep it company, figuring genitalia. Dr. Dyar replied to him on page 399. I have to admit that I erred in producing the name *latirena* rather vaguely, though I thought I made it clear that it was applied to all B. C. forms of *hibisci* hitherto erroneously called *pacifica*. Smith was near the mark in saying that it could only be applied as a synonym of the entire *pacifica* Smith series, with the exception, of course, of *pacifica* Harvey. As Smith then described two variations of the B. C. forms, both of which I consider variations of *hibisci*, to avoid future confusion I refer the first of those names, *inflava*, to *latirena* Dod. His other name, *inherita*, applied to B. C.

specimens signifies a more strigate and irrorate form of the same. What he calls *instabilis* Fitch is, of course, a citation of Fitch of European *instabilis* Schiff,=*incerta* Hübn., which however is not very obviously distinct. *Malora* Smith, described from three males and two females from Calgary, is applied to a dull smoky-grey form of the same species. The variation seems to be very wide wherever the species occurs, though it may be said that, in general, Pacific coast specimens are richer in colour than those from the east, and Alberta specimens intermediate. I can, however, match Calgary and Vancouver specimens almost exactly, and also some from Calgary, Chicago and Montreal. *Quinquefascia'a*, as the name implies, stands for a form with five distinct transverse lines. *Brucei* Smith from Denver, and Garfield Co., Colorado, and *proba* Smith from Alameda Co., Calif., I cannot believe to be distinct from *hibisci*, but *nubilata* Smith may prove distinct. I have a note that I found specimens from that region in Smith's collection suggesting a new species, but failed to make a satisfactory separation. Hampson makes *insciens* Walker, and *confluens* Morr. synonyms of *hibisci*, but calls *hibisci* "ab.I." with the spots joined. This aberration, according to Smith, is also Morrison's *confluens*. Walker's type of *insciens* is a female labelled "U. S. A., (Doubleday)" and has the subterminal line, and annuli to the spots, particularly the orbicular, unusually pale and wide. I have a note to the effect that when I was at the British Museum last March, a specimen labelled *confluens* Morr., the type of *insciens* Walker, and three pale, even, Calgary specimens stood separated in the collection. I fail to see that any such separation is warranted. I also found *latirena* and *pacifica* in the same series under *pacifica*, though I feel satisfied that the latter is distinct.

345. *Cleoceris populi* Strk.—The type of *populi* is from Loveland, Colo., and is a pale, slightly marked thing, and not unlike the form figured in Holland. I have seen Colorado and Wyoming specimens in other collections, but all were paler and less maculate than my Calgary series.

347. *Xylina amanda* Smith.—There are male and female types in the Washington collection, the former from Pullman, Washington, and the latter from Calgary. The Pullman specimen is much paler in colour than the other, and my notes say that they may

possibly be two species. I have specimens from Miniota and Aweme, Man., and Vineyard, Utah, which resemble the Calgary form, and two from Wellington, Vanc. I., are paler, more luteous and less maculate, probably like the Pullman form. The closest ally of this secies is *petulca* Grt., which occurs on Vancouver Island also. *Amanda* is a narrow-winged species, with a rather conspicuous pale yellowish patch in the cell, obscuring the upper portion of the reniform and reaching to the t. p. line. In *petulca*, though the spots themselves are yellowish filled, there is no such patch. Another conspicuous character in *amanda* is that the lower edge of the reniform is, in all my series, filled with dark fulvous. It is probable that I may sometimes, in naming offhand without comparison, have given the name *amanda* to pale specimens of *petulca*. In fact I have suspected them of being variations of one species, but am convinced of their distinctness. I have often seen them mixed in collections. *Amanda* narrowly escaped redescription by its author about two years ago.

348. *X. fagina* Morr.—I have not seen the type of this species, but the Alberta form is the same as the *fagina* of eastern collections. It is very rare here.

349-350. *X. georgii* Grt.—I have taken no more specimens of this species than those I originally listed as *oregonensis* Harvey, and *ancilla* Smith, but after studying material from all over the continent for some years I have long ago come to the conclusion that *oregonensis* and *ancilla* of my list are the same species. I have a specimen from Miniota, Man., compared with the type of *georgii* from Orillia, Ont., in the British Museum, and this scarcely differs from my cotype of *ancilla*. The species is one of the most variable of our Xylinas, the variation consisting in differences in shade of the ground colour, distinctness of maculation, and size and shape of the discoidal spots. Some specimens have slightly brown, almost reddish scales in the reniform, though this is rather unusual. I offer a list of what I consider synonyms of this species, with the type localities of each:

Oregonensis Harvey, Oregon.

Holocinerea Smith, Winnipeg, Man.; Vancouver, and N.W. British Columbia; Pullman, Washington; Sierra Nevada, Cal.

Fletcheri Smith, Ottawa.

Ancilla Smith, Calgary; Cartwright, Man; Wellington, B. C. (The male type is from Cartwright, and is practically a dead mate for the male type of *fletcheri*).

Vertina Smith, Corvallis, Oregon; B. C.

Var. *emarginata* Smith, Colorado Springs and Glenwood Springs, Colo. A pale, slightly marked form.

The only type of *oregonensis* that I have seen is an Oregon male in the Henry Edwards' collection, and my notes say that it is a pale *holocinerea*. I am in doubt as to the identity of Fig. 26., Plate IV, of Smith's Monograph, and it struck me that the material in his collection under *oregonensis* probably included two species. The *oregonensis* of Hampson's Catalogue, Plate CIII., Fig. 7, is a Californian specimen, and is certainly not *georgii*. I have in my collection a male and two females of a species from Glenwood Springs, Colorado, from Dr. Barnes. One of them is labelled "*oregonensis* Harvey, identified by Smith," and the other is labelled "*torrida* Smith" by Dr. Barnes. In my opinion these specimens are undoubtedly rather poorly marked *antennata*, and agree well with my eastern series of that. Under the description of *torrida*, Smith says that "the more obscure examples remind one of the *antennata* type" and it is possible that the latter species was included in the type material. It will be necessary to re-examine the types to decide, as I have previously mixed the forms myself, but the species I have at present under *torrida* is a brightly marked thing from Vancouver Island, and is that figured by Smith in his monograph under the name, on plate V., fig. 31.

(To be continued.)

DURING the latter half of January Mr. F. W. L. Sladen, Assistant Entomologist for Apiculture in the Division of Entomology, Ottawa, has been travelling in Nova Scotia and New Brunswick. A short course in Apiculture was given at the Agricultural College, Truro, and subsequently Mr. Sladen investigated apicultural conditions and possibilities and addressed meetings in the two provinces.

CORRECTION.—P. 367, line 19, after September 12 add 1911, December Number, CANADIAN ENTOMOLOGIST. F. M. WEBSTER.

TACHINIDÆ AND SOME CANADIAN HOSTS.

BY J. D. TOTHILL, DIVISION OF ENTOMOLOGY, OTTAWA, ONT.

In working over the Tachinidæ in the collection of the Division of Entomology, at Ottawa, a number of breeding records were encountered. Thirty-nine of these are new, in so far as the writer is aware, and these form the basis of the present list. In addition to these thirty-nine, there are seven that have been published since the appearance of Coquillett's "Revision of the Tachinidæ of America, north of Mexico," and Aldrich's "Catalogue of North America Diptera." These seven are included in the present list; they are indicated by an asterisk (*), and reference is made in each case to the published record.

The majority of these records were obtained by Dr. James Fletcher and Mr. Arthur Gibson. To the latter colleague, whose kindly assistance has made possible the compilation of the present list, the writer is under numerous obligations. The letters J. F. or A. G. placed in brackets after the species indicate the person who was responsible for the rearing. A few records were obtained by others than the above; in these cases the names or initials of the persons responsible for the rearing are given.

No doubtful records are included in the list. The arrangement follows that of Mr. D. W. Coquillett in the excellent list of tachinid flies and their hosts contained in his "Revision" (loc. cit., p. 9).

PARASITES.	HOST INSECTS.
Blepharipeza adusta Loew........	*Halisidota caryæ* Harris.—Bred from cocoons of host collected at Ottawa; 11 specimens, issued June 16–July 4. (A. G.)
	Halisidota maculata Harris.—Bred from cocoons of host collected at Ottawa; 1 specimen. (A. G.)
	Malacosoma disstria Hubn.—Bred at Fredericton, N. B., from larvæ and pupæ collected locally and at Ottawa; numer-

ous specimens, issued spring. (J. D. T.)

Blepharipeza leucophrys Wied.... *Sphinx chersis* Hbn.—Bred from specimen of pupa collected at Ottawa; 1 specimen, issued May 30. (A. G.)

Euphorocera claripennis Macq.... *Heliophila unipuncta* Haw.—Bred from larva collected at Ottawa; 1 specimen. (J. F.)

Malacosoma sp.—Bred at Ottawa from larva; place of collection not known. (J. F.)

Exorista affinis Fall............. *Phragmatobia fuliginosa* Linn.—Bred from cocoons collected at Ottawa; 2 specimens, issued April 13 and 27. (A. G.)

Exorista cheloniæ Rond.......... *Apantesis ornata* Pack., var. *achaia* G. & R.—Bred at Ottawa from larvæ collected at Kaslo, B. C.; 3 specimens, issued June 6. (A. G.)

Malacosoma disstria Hbn.—Bred at Fredericton, N. B., from larvæ collected locally and at Ottawa; numerous specimens, issued spring. (J. D. T.)

**Phragmatobia assimilans* Walk., var. *franconia* Slosson.—Bred at Ottawa from larvæ collected at Hymers, Ont,; 1 specimen, issued May 7; c.f. A. Gibson, Ent. Record, 1910, p. 18, and A. Gibson, CAN. ENT., Vol. XLIII., p. 127.

Exorista eudryæ Town........... *Euthisanotia grata* Fab.—Bred from larva collected at Ottawa; 1 specimen, issued Aug. 27. (J. F.)

Exorista futilis O. S. . . . . *Isia isabella* S. & A.—Bred from larva collected at Ottawa; 1 specimen, issued May 21. (J. F.)

Hyppa xylinoides Gn. — Bred from larva collected at Ottawa; 1 specimen, issued May 23. (C. H. Young.)

Exorista helvina Coq. . . . . *Lycia cognataria* Gn.—Bred at Ottawa from larvæ collected at Coldstream, B. C.; 4 specimens, issued May 29 and June 12. (A. G.)

Exorista nigripalpis Town. . . . . . . *Tortrix fumiferana* Clem.—Bred by G. E. Sanders at Ottawa from larvæ collected at Chicoutimi, St. Sylvestre and Maniwaki, P. Q., and Duncans, B. C.; 68 specimens, issued June 18–July 10.

Exorista pyste Walk. . . . . *Tortrix fumiferana* Clem.—Bred at Ottawa by G. E. Sanders from larvæ collected at Chicoutimi, P. Q.; 2 specimens, issued July 3.

Exorista vulgaris Fall. . . . . *Tortrix fumiferana* Clem.—Bred at Ottawa by G. E. Sanders from larvæ collected at Chicoutimi, St. Sylvestre, St. Gabriel de Brandon and Montcalm, P. Q.; 16 specimens, issued June 18–July 10.

Frontina frenchii Will. . . . . *Papilio daunus* Bdv.—Bred at Ottawa from pupæ collected at Kelowna, B. C.; 9 specimens, issued Aug. 23. (A. G.)

Papilio eurymedon Bdv.—Bred at Ottawa from pupæ collected

	at Nanaimo, B. C.; 10 specimens, issued April 12, 16, 17 and 19. (A. G.)
	Samia columbia Smith.—Bred at Ottawa from pupæ collected at Cartwright, Man.; 7 specimens. (J. F.)
Frontina tenthredinidarum Town.	*Cladius pectinicornis* Fourc.—Bred from larva collected at Ottawa; 1 specimen, issued Aug. 29. (J. F.)
	Emphytus canadensis Kirby.—Bred from larva collected at Ottawa; 1 specimen, issued Sept. 1. (J. F.)
	**Nematus erichsonii* Hartig.—Bred from cocoons collected at St. John, N. B.; c.f. C. G. Hewitt, "The Larch Sawfly," Bull. No. 5, Div. of Ent., Ottawa.
Gonia capitata DeG.	*Paragrotis ochrogaster* Gn.—Bred at Ottawa from pupæ collected at Cow Bay, C. B.; 1 specimen. (J. F.)
	Agrotid sp.—Bred from pupa collected at Ottawa; 1 specimen, issued spring. (J. F.)
Linnæmyia anthracina Thompson.	**Hyphoraia parthenos* Harris.—Bred at Ottawa from larvæ collected at Hymers, Ont.; 2 specimens, issued May 16; c.f. W. R. Thompson, CAN. ENT., Vol. XLIII., No. 8, p. 266.
Masicera eufitchiæ Town.	*Halisidota tessellaris* S. & A.—Bred from pupæ collected at Ottawa; 2 specimens, issued Aug. 8. (A. G.)

Masicera myoidea Desv..........**Papaipema appassionata* Harvey.—Bred at Ottawa from larva collected by C. H. Young, at Meach Lake, P. Q.; 1 specimen, issued Aug. 13; c.f. James Fletcher, Ent. Rec. 1906, p. 102.

Papaipema purpurifascia G. & R.—Bred from larvæ collected at Ottawa; 9 specimens, issued Aug. 24–28. (A. G.)

Masicera rutila Meig............*Tortrix fumiferana* Clem.—Bred at Ottawa by G. E. Sanders from pupæ collected at Duncans, B. C.; 2 specimens, issued July 10 and 19.

Phorichæta sequax Will..........*Heliophila commoides* Gn.—Bred from specimens of host collected at Ottawa; 7 specimens, issued June 10. (A. G.)

Phorocera leucaniæ Coq..........**Euproctis chrysorrhæa* Linn.—Bred at Fredericton, N. B., from larva collected by P. N. Vroom at Chamcook, N. B.; 1 specimen, issued spring. A valuable parasite of the same host in Massachusetts; c.f.. Fiske & Howard, Bull. 91, Bureau of Ent., U. S. Dept. of Agr., Washington, D. C. (J. D. T.)

Phorocera saundersii Will........*Ennomos magnarius* Gn.—Bred at Ottawa from pupa collected at Mt. Hebron, N. B.; 1 specimen, issued in office, Dec. 31. (J. F.)

Euvanessa antiopa Linn.—Bred

from pupa collected at Ottawa; 1 specimen. (J. F.)

Plagia americana V. d W........*Plusia æreoides* Grt.—Bred from larvæ collected at Ottawa; 2 specimens, issued June 10. (A. G.)

Sturmia albifrons Walk..........*Heliophila unipuncta* Haw.—Bred from larvæ collected at Ottawa; 4 specimens, issued July 8. (J. F.)

Sturmia inquinata V. d W.......*Sphinx chersis* Hbn.—Bred from larvæ collected at Ottawa; 20 specimens, issued May 22. (A. G.)

Sturmia normula V. d W........*Lemonias taylori* Edw.—Bred at Ottawa from larva collected on Vancouver Island; 1 specimen. (J. F.)

Sturmia phyciodis Coq...........*Phyciodes tharos* Drury.—Bred from specimen of host collected at Ottawa; 1 specimen, issued June 23. (J. F.)

Tachina mella Walk.............*Datana ministra* Drury.—Bred at Ottawa from larvæ collected at Armstrong, B. C.; 2 specimens, issued in office, Oct. 29. (A. G.)

Notolophus antiqua Linn.—Bred at Ottawa from larvæ collected at Rudolph, N. S.; 5 specimens, issued Sept. 3. (A. G.)

Tachina simulans Meig.........*Harpiphorus tarsatus* Say.—Bred from specimen of host collected at Ottawa; 1 specimen, issued June 30. (J. F.)

Winthemia fumiferanæ Tothill....**Tortrix fumiferana* Clem. — Bred at Ottawa by G. E.

Sanders, from Maniwaki, Que., and Duncans, B. C.; 26 specimens; c.f. J. D. Tothill, Can. Ent., Vol. XLIV., No. 1, p. 2.

Winthemia quadripustulata Fab. . . *Cucullia convexipennis* G. & R. —Bred from larva collected at Ottawa; 1 specimen. (J. F.)

**Marumba modesta* Harris.—Bred from larva; c.f. James Fletcher, Ent. Record, 1903, p. 99.

Pholus achemon Drury.—Bred from pupa collected at Ottawa; 1 specimen. (A. G.)

The specimens reared from the above three hosts issued May 11, 16 and Sept. 21.

GEOMETRID NOTES—NEW VARIETIES

BY L. W. SWETT, BOSTON, MASS.

Cleora pampinaria var. *nubiferaria*, n. var.

Expanse 29 mm.; palpi very short. Fore wings smoky black with line running from inner margin up to vein a 1, then along the vein for about 3 mm., where it stops. In the centre of the fore wings on the median vein there is a dark line, especially broad at the vein, where it curves upward at right angles to the costa. On the outer fourth there is another band parallel to this, which runs from the median vein to costa just beyond the faint black discal spot. These lines are practically the same as in normal *pampinaria* but the black colourings of the wings render them indistinct. There is a very distinct white zig-zag line running parallel to the outer margin from costa to inner margin with a long white projection near M_2. The fringe is quite long and black with points at base. The hind wings are of the same smoky colour as the fore wings, with a faint extra-discal black line, which shows as black points on the veins. The discal spot appears as a ring and touches the extra-discal line. There is a trace of an irregular white line near outer margin. The outer edge of the wing is slightly scalloped and the fringe is rather long. Beneath the fore wings are smoky black with discal spot showing through; the apices of the wings are tipped with white. Hind wings of the same colour as fore wings with black discal spot instead of ring as above.

Type 1 ♂, Cincinnati, Ohio; through the kindness of Miss A. F. Braun.

This is no doubt a case of melanism and was so identified for me by Mr. Grossbeck. Melanism seems to be rare in this country but is common in Europe where it seems to represent a more recent type.

Ania limbaria var. *chagnoni*, n. var.

Expanse 22 mm.; palpi very short. Fore wings bluish yellow with chocolate border, basal space and mesial space of the same colour up to the chocolate-coloured margin. The basal line about 4 mm. out from body runs at right angles from costa to median vein, then almost straight to inner margin. There are traces of a large lunule near where the discal spot would be and expanding to the extra-discal line. Beyond the extra-discal line the entire margin is chocolate-coloured. Hind wings bluish yellow to the extra-discal line, beyond the margin chocolate as in fore wings. There is a large lunule in the discal space. Fore wings of the same colour as above, the chocolate margin showing through. The hind wings are the same as above, bluish yellow with a chocolate margin. This seeems to be a case of melanism but the markings are not identical with *limbaria*. Possibly this is a northern species. It is so different in appearance from *limbaria* that one would hardly recognize it, or where it belonged, were it not for the peculiar spur of the hind tibiae.

Type 1 ♂, St. Therese Isle, St. Johns Co., Que., VII.–9–1912; through the kindness of Mr. G. Chagnon, after whom I take pleasure in naming this unique variety.

Mr. Frederick Knab, of the U. S. Bureau of Entomology, has been recently appointed Honorary Custodian of the Diptera in the U. S. National Museum, to succeeed the late Mr. D. W. Coquillett.

THE SPRING GRAIN APHIS OR "GREEN BUG."

This aphis *Toxoptera graminum* Rond., must not be confused with the wide-spread grain aphis *Macrosiphum granaria* Buckton, formerly known as *Siphonophora avenæ* Fab., which is destructive from time to time in Canada. *Toxoptera graminum* has been found in western Canada, but it has not as yet inflicted depredations of so serious a character as have been recorded from time to time since 1890 in the United States. The very destructive nature of the "Green Bug," as it is popularly termed, in the United States in 1907, in which year it was also recorded in Manitoba and Saskatchewan, led the United States Congress to make a special appropriation for its investigation. These investigations have been continued up to the end of 1911 and the Bureau of Entomology of the United States Department of Agriculture have now published a record of the entire investigation by F. M. Webster and his assistant, W. T. Phillips (Bull. No. 110, Bur. Ent., U. S. Dept. Agric., Washington, 153 pp., 48 figs., 9 pls., 1912).

It is not possible within the compass of a short article to refer in more than a brief manner to the varied and valuable results of this study. The study is of unusual interest in that it affords results of value not only to the economic worker but also to the embryologist and to the student of insect bionomics, all of which results are necessary to a complete interpretation of this remarkable insect's habits and depredations.

South of the 35th parallel it appears to be permanently viviparous and to breed without the appearance of the sexes. It is unable to survive hot and dry conditions in the Southern States. In Indiana the overwintered eggs hatch from the end of March to about April 10th giving rise to wingless stem-mothers which pass through five instars. These stem-mothers reproduce viviparously producing wingless viviparous females and winged viviparous females.

The great fecundity of the aphids, due to their viviparous habits, is well known and the results of the authors' study of the progeny of single lines are of great interest in this connection. In Indiana the eggs hatched on March 27th, and the first-born aphids produced twenty-one generations before the adult ovipositing females appeared in November; the last born females produced ten generations. In Texas there were twenty-five generations between March 31st. and November 3rd. The age at which the females begin to reproduce varies according to the season; early in the season it is from twenty to twenty-seven days, from May to September it is from about six to sixteen days and later in the season from twelve to fifty-three days, the average for the three seasons of the year being early spring twenty-two days, summer nine days, and early fall nineteen days. In Texas the time is shorter, the shortest time being six days. The reproductive period is longer in the average in the spring and fall than in the summer; in the spring the average is eighteen days, in the summer twenty-six days and in the fall, forty-five days. The longest likewise is greater in the spring and fall than in the summer, the average is thirty-five days and the longest is seventy-eight days. The rapidity of production it very great: in Indiana the greatest number of young produced by one female in twenty-four hours was eight, in Texas ten. The greatest number of young produced by one individual was ninety-three. The average number of young for the entire viviparous breeding season, over a period of three years (1907-9), was 28.2; the average number of young produced in a day is greatest in the Spring.

The sexual forms, male and female, appear in Indiana at the end of September and adults may be found from October until the cold kills them off in December.* The oviparous females become adult in 11 to 41 days according to weather conditions, and if males are present they oviposit in from three to nine days. The males live from 8 to 10 days after reaching maturity, the females from 31 to 68 days if males are present; if males are not present they can live 88 days after reaching maturity. Aberrant individuals were found containing both living embryos and true eggs.

Throughout the Northern United States and no doubt in

* On page 77 the author states "one agamic female may reproduce all agamic individuals, a combination of agamic males and oviparous females or only true females and males." What are "agamic males"? An agamic female we know is a female which produces young in a parthenogenetic manner, that is, without fertilisation by the male. Huxley was the first, I beleive, to use the term "agamic" for this form of reproduction in the Aphids. As the male aphid, fortunately, cannot give birth to young either sexually or asexually is it not misusing the word to apply it to the male?

Canada also, Blue grass (*Poa pratensis*) is the most common host of Toxoptera.

The diffusion or natural spread of the Green Bug is dependent upon a number of factors both meteorological and biological. For example the influence of wind in dispersion depends upon whether the insect is in a winged or apterous condition and this is, of course, dependent upon those factors producing these conditions such as the curtailing of food supply, etc. The most favourable conditions for natural diffusion appear to be a decreasing food supply with a fairly high temperature and a not excessive parasitism.

The effects of temperature varied according to the locality whether in a north or southern region. In the north, where the effects of the temperature concern us most, the insect winters in the egg state. Here warm winters are of less importance and cool weather during spring and early summer exert a far greater influence on the numerical abundance of the insect.

As the early developmental stages in the winter eggs are effected by the temperature a complete study of the biology of *Toxoptera* necessitated the study of the embryology. The results of this study and the figures of the embryonic stages which are given are a welcome addition to our knowledge of insect embryology, the observations on that peculiar embryonic structure which the present authors have termed the "polar organ" being of special interest. The general results of their study, however, does not materially affect the early observations of Witlaczil, Will and others and the more recent work of Tannreuther.

The study of the natural enemies of the Green Bug naturally forms one of the most important sections of the work. The efforts made in certain quarters in the direction of distributing the chief parasite *Aphidius testaceipes* Cresson (known also by a host of other synonyms under the genus *Lysiphlebus*) and the reported success of these efforts made it extremely desirable that the biology and distribution of this parasite should be carefully studied and this fact is especially borne out by the results of the present thorough study of *Aphidius*, its biology and its relation to meteorological conditions in Kansas and other States. It was found that not only did this parasite occur over almost the entire United

States but that it would breed interchangeably from *Toxoptera* into other species of Aphids and in addition was reared from a large number of common and widespread species of Apids. Taking these facts into consideration it is very easy to see, as the authors rightly point out, "that it would be only in rare instances and under peculiar conditions that a locality would be found where *Aphidius testaceipes* would not be lurking, waiting for favourable weather conditions and abundant supplies of its host aphids to make its appearance in greater or less numbers." The effectiveness of this parasite will be appreciated when it is realized that a single female *Aphidius* may parasitize no less than 301 *Toxoptera*. No wonder their natural control is, at times, so sweepingly effective! Regarding the artificial distribution of the parasites, these investigations naturally point to the "futility of attempting materially to increase its numbers or efficiency by artificial introduction into grain fields" and further, I would add, they point to the necessity of making as careful studies as possible of the parasites before adopting any extensive system of artificial distribution. The account of the remedial and preventive measures is prefaced by the statement that with "an outbreak of this pest fully established and the winged adults being carried by the wind and scattered over the fields there to settle down and reproduce, the difficulties in the way of control are quite insurmountable." Bush-drag experiments, and spraying did not give satisfactory results or were impracticable. Cultural methods of prevention are the most important and the chief of these is the destruction of volunteer grain. In this connection I would venture to suggest, would it not be well to leave the volunteer growth as a trap crop, then seed later or sow spring oats? In the north the close grazing of waste lands is recommended; this would result in the destruction of a considerable proportion of the eggs laid on the Blue grass (*Poa pratensis*) which appears to be the normal host of the Green Bug in northern localities.

Great credit is due to Mr. F. M. Webster and his very able assistants, particularly Mr. Phillips, for the thorough character of this investigation, the results of which will be of great assistance to others working in the same field, and confronted with similar problems.

C. Gordon Hewitt.

GENERIC TABLES FOR THE CIMICID SUBFAMILIES PHYLLOCEPHALINÆ, PHLŒINÆ AND DINIDORINÆ.

*BY THE LATE GEORGE W. KIRKALDY.

TABLE OF GENERA OF PHYLLOCEPHALINÆ.

1 (34) Pronotum rounded laterally, or if produced, then the produced part does not extend apically as far as the eyes.

2 (19) Lateral angles of pronotum obtuse or rounded, or if acute, then scarcely prominent.
(For *Delocephalus* No. 19.)

3 (18) Interoanterior angles of pronotum not produced.

4 (17) Hind angles of pronotum near the scutellum, not angulate.

5 (16) Lateral margins of pronotum not prominent anteriorly.

6 (9) Head short, scarcely longer than its breadth between the eyes, if at all.

7 (8) Costal margin of corium not lævigate, unless anteriorly, or rather sparsely punctured......5. *Metonymia* Kirk.

8 (7) Costal margin of corium entirely pale, lævigate, sometimes marked with spots or transverse impressions or black points, in remote transverse series.........................6. *Dalsira*† A. & S.

9 (6) Head distinctly longer than its breadth between the eyes.

10 (15) Antennæ extending apically as far as the apex of the head.

11 (12) Lateral margins of head laterally not or scarcely converging towards the apex, till close to it....................16. *Phyllocephala* Laporte

12 (11) Lateral margins of head distinctly converging to the apex.

13 (14) Lateral lobes of head plane or somewhat concave.......................10. *Schyzops* Spinola.

14 (13) Lateral margins of head convex....14. *Dichelorhinus* Stal.

15 (10) Antennæ not extending as far as apex of head.......................15. *Randolotus* Distant.

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*These three tables are a beginning of the numerous uncompleted papers left by my late friend, which I purpose to publish from time to time, as I am able to edit them and tie up loose ends, if such there be. Fragments though these be, they will, nevertheless, prove highly useful in the absence of any late general work on these subfamilies.—J. R. T. B.

† 22. *Frisimelica* Distant seems to be near here, but the description is defective.

16 (5) Lateral margins of pronotum prominent anteriorly..................24. *Delocephalus* Distant.

17 (4) Hind angles of pronotum acutangular near the scutellum..................23. *Megarrhamphus* Bergr.

18 (3) Interoanterior angles of pronotum produced, or at least strongly dentate..............3. *Lobopeltista* Schout.

19 (2) Lateral angles of pronotum strongly acute or very prominent.

20 (27) Lateral angles of pronotum not turned forward.

21 (24) Lateral lobes of head contiguous in front of the median lobe.

22 (23) Anterolateral margins of pronotum straight......................7. *Mercatus* Distant.

23 (22) Anterolateral margins of pronotum sinuate......................9. *Schismatops* Dallas.

24 (21) Lateral lobes not contiguous, unless at the base.

25 (26) Interolateral margins of lateral lobes as long as from apex of median lobe to base; lateral angles of pronotum acuminate....................18. *Diplorhinus* A. & S.

26 (25) Interolateral margin very short in front of median lobe; lateral angles of pronotum acute. 4. *Storthogaster* Karsch.

27 (20) Lateral angles of pronotum turned more or less forward.

28 (29) Lateral angles of pronotum prominent, but apically blunt......................8. *Sandehana* Distant.

29 (28) Lateral angles of pronotum acute.

30 (33) Anterolateral margins of pronotum slightly sinuate.

31 (32) Antennæ longer, second joint reaching or scarcely exceeding apex of head; lateral angles of pronotum produced....................12. *Gonopsis* A. & S.

32 (31) Antennæ shorter, second joint scarcely reaching apex of head; lateral angles of pronotum rounded, scarcely prominent....................13. *Kaffraria* Kirk.

33 (30) Anterolateral margins of pronotum deeply emarginate....................19. *Macrina* A. & S.

34 (1) Pronotum with lateral angles prominently extending forwards very distinctly beyond the eyes.

35 (44) First segment of antennæ not reaching to apex of head.
36 (41) Lateral margins of pronotum not extending as far as apex of median lobe of head.
37 (38) Lateral lobes of head contiguous....11. *Salvianus* Distant.
38 (37) Lateral lobes of head not contiguous, except at base.
39 (40) Anterolateral angles of pronotum acutely prominent....................17. *Roeburnea* Schout.
40 (39) Lateral angles of pronotum acuminately prominent................22. *Melampodius* Schout.
41 (36) Lateral angles of pronotum extending as far as the apex of the median lobe of the head.
42 (39) Lateral lobes of head acutely produced. 20. *Tetroda* A. & S.
43 (42) Lateral lobes of head exteriorly rounded...21. *Gellia* Stal.
44 (35) First segment of antennæ extending beyond apex of head..........................1. *Cressona* Stal.

TABLE OF GENERA OF PHLŒINÆ.

1 (4) Antennæ inserted close to the eyes (*Neogeic*).
2 (3) Scutellum as long as the space from its hind angles to the base of the laminate portion of the abdominal apex, distinctly shorter than the corium; lateral lobes of the head contiguous or overlapping...1. *Phlœa* Lep. & Serv.
3 (2) Scutellum more than twice as long as the space between the hind angles and the basal part of the laminate apex of the abdomen, very slightly shorter than the corium; lateral lobes of the head contiguous only basally in the middle..................2. *Phlœophana* Kirkaldy.
4 (1) Antennæ inserted above one-third from apex of the head (*Palæogeic*)....................3. *Serbana* Distant.

The fossil *Palæophlœa* is not included.

TABLE OF GENERA OF THE SUBFAMILY DINIDORINÆ.

1 (16) Lateral margins of abdomen not tuberculately dentate.
2 (15) Pronotum anteriorly not wider than the head with eyes; pronotum laterally sometimes marginate, never laminate.
3 (12) Tarsi 3-segmentate.
4 (9) Antennæ 4-segmentate.

5 (8) Lateral lobes of head either not longer than the median, or, if so, then contiguous, at least partly.
6 (7) Labium scarcely extending to middle coxæ; hind femora not widened at base............1. *Cyclopelta* A. & S.
7 (6) Labium extending to hind coxæ; hind femora (at least in ♀) strongly widened at base..2. *Patanocnema* Karsch.
8 (5) Lateral lobes of head much longer than the median, and not at all contiguous...............3. *Dinidor* Latr.
9 (4) Antennæ 5-segmentate.
10 (11) Head subæquilateral, or scarcely transverse, lateral margins straight or slightly sinuate; eyes sessile; ♂ pygophor not emarginate, apically rounded, rarely with an obsolescent sinuation in the middle..4. *Aspongopus* Laporte.
11 (10) Head transverse, deeply sinuate in front of the stylate eyes; fore femora distinctly spinose towards the apex; ♂ pygophor distinctly sinuate apically. 5. *Colpoproctus* Stal.
12 (3) Tarsi 2-segmentate.
13 (14) Lateral margins of head not contiguous, head laterally with a spine in front of the eyes....6. *Thalma* Walker.
14 (13) Lateral lobes of head contiguous, head spineless in front of the eyes.......................7. *Urusa* Walker.
15 (2) Pronotum anteriorly much wider than the head with eyes; pronotum laterally distinctly laminate.8. *Sagriva* Spinola.
16 (1) Lateral margins of abdomen tuberculately dentate.
17 (18) Lateral margins of pronotum obliquely straight.....................9. *Byrsodepsus* Stal.
18 (17) Lateral margins of pronotum angularly sinuate..................10. *Megymenum* Laporte.

THE Province of Quebec is to be congratulated on its decision to appoint a Provincial Entomologist. The Rev. Abbe V. A. Huard, the Conservator of the Provincial Museum at Quebec, has been appointed to the office of Entomologist. As the editor of "Le Naturaliste Canadien" and successor to Provancher, he is well known to entomologists in Canada, and we wish him all success in his new duties in a field which offers unparalleled opportunities for entomological work and assistance to those whose livelihood depends on successful husbandry in the farm, field and forest.

SOME TROPIC REACTIONS OF *MEGILLA MACULATA* DE G. AND NOTES ON THE HYDROTROPISM OF CERTAIN MOSQUITOES.

BY HARRY B. WEISS, NEW BRUNSWICK, N. J.

This ladybird, which is the only species in New Jersey hibernating in sufficient numbers to be considered a colony, lends itself readily to experimentation, and the colonies containing as a rule about a thousand individuals may be found in different localities usually under a piece of bark or a mass of dried leaves.

This colonial hibernation is the result of various reactions to tropic stimuli. First the question arises as to just why they congregate in large numbers and this may be explained by chemotropism. All Coccinellidæ emit peculiar odors and as the colony increases, so does the odor, thereby making the chemotropic stimuli stronger and more effective. Mr. Edward K. Carnes in bulletin No. 5, Vol. I, of the California State Commission of Horticulture, writes that he has located colonies of *Hippodamia convergens* in that state simply by the odor alone. Here, however, the individuals in a colony number two and a half millions or more.

A lowering of the temperature as winter approaches with a corresponding decrease in the food supply undoubtedly renders them exceedingly susceptible to chemotropic stimuli. With *Megilla maculata*, there is no evidence at present that anemotropism plays any part in the selection of the hibernating quarter. Once in their place of hibernation, they become positively thigmotropic and negatively phototropic. Two hundred individuals were removed from a colony and placed in a glass breeding cage, one end of which was constructed so that they could if they desired act positively photo- and thigmotropic and the other end so that they could act only negatively phototropic and positively thigmotropic. Every one selected the dark end. This happened on both sunshiny and cloudy days. During all operations the temperature of the entire cage was uniform as indicated by thermometric tests. During the above experiment the temperature was gradually lowered in eight hours from 70° F. to 36° F.

At a temperature of 54° F. they remained as before. At a temperature of 64° F. about one third became positively phototropic and negatively geotropic, and their activity undoubtedly made them susceptible to chemotropic stimuli from a food viewpoint.

At a temperature of 70° F, about one-half were active and at 75° F. all were active. When the temperature was suddenly lowered as from 75° to 36° F. all became dormant at once and exhibited no tropic reactions. By at once I mean within ten or twelve minutes. Without doubt thermotropism plays an important if not the most important part in deciding just what reactions are to occur. A gradual lowering of the temperature such as would naturally result in the beetles acting phototropically and thigmotropically while a sudden drop resulted in what might be called immediate partial hibernation. Of course with a soft bodied insect this would have resulted in death. When the temperature of the air was 42° F., that of their natural hibernation place was 54° F. which indicates an effort to secure optimum conditions.

After emerging from winter quarters, the females of *Culex pipiens* are at first positively chemotrophic. After having fed they become positively hydrotropic and deposit their eggs on the surface of water. While in hibernation during which time they may be fairly active, depending on the temperature of their hibernation quarters, they are strongly negatively hydrotropic. Food and water placed within easy reach of hibernating specimens were always avoided, even when the temperature of their surroundings was 75° or 80° F.

Aedes sollicitans and *Aedes cantator* are also positively hydrotropic but not to the extent of most other mosquitoes. With these species eggs are deposited in damp depressions and not on the surface of the water. Sterile females of both of these species are strongly negatively hydrotropic and fly long distances away from salt marshes where they breed. However this migratory habit, or at least the direction they take, is undoubtedly influenced by anemotropism inasmuch as they allow themselves to be carried by strong breezes and will fly inward against light breezes. Sterile females of *Aedes tæniorhynchus*, which has a similar life history to *sollicitans* are to a certain extent negatively hydrotropic.

Aedes salinarius, another salt marsh form is as strongly positively hydrotropic as *Culex pipiens*, in fact its hydrotropic reactions are similar to those of *pipiens*, as is its life history.

At different periods during a mosquito's life, its hydrotropic reactions are overshadowed by responses to chemotropic and phototropic stimuli and in some cases, negative hydrotropism might be mistaken for positive chemotropism. In the cases of the sterile females of *Aedes sollicitans*, chemotropism plays very little if any part in explaining their migratory habit. If it did the migrations would not be so extensive or cover the long distances they do.

Negative hydrotropism seems to be more prevalent among the salt marsh than other forms, in fact other species are negatively hydrotropic only for short periods and the females responding to such stimuli are not barren. For some reason the sterility of *sollicitans* seems to render it exceedingly susceptible to negative hydrotropic stimuli.

ANNUAL MEETING OF THE BRITISH COLUMBIA BRANCH.

The annual meeting of the British Columbia Entomological Society took place on January 9th, 1913, in Victoria. A morning, afternoon and evening programme was arranged. From 18 to 27 members were present during the day. A varied programme was rendered which included several reports from districts in the Province, viz., the Victoria District, the Lower Mainland, the Okanagan and the Kootenay.

An interesting lecture was given on the use of Carbon Bisulphide as a fumigant under coastal conditions by Mr. W. H. Lyne, Assistant Inspector of Fruit Pests. Mr. W. H. Brittain followed with a paper prepared on the important subject of Beneficial Insects, bringing the notice of the members forcibly to the fact that applied parasitic entomology was well to the forefront of present day economic entomology. He gave a number of interesting records which had taken place during the past few years in this especial connection.

Mr. G. O. Day, F. E. S., Duncans, presented a paper on *Xanthia pulchella* Smith, and offered a few systematic notes on its life history. Mr. R. C. Treherne gave the members present a brief outline of the life history of the Strawberry Root Weevil (*Otiorhynchus ovatus*), illustrating his points by means of diagrammatic charts.

Mr. Thomas Cunningham gave a long and very interesting paper on the strides that had taken place in the United States and in the world in general in regard to the placing of quarantine measures against injurious insects liable to importation through the medium of trade. His memorandum was listened to with great interest as it contained a summary of all the acts and regulations that had been passed during the past few years, and the reasons for the consideration of these acts and regulations and followed his paper with an outline of the insects at present in B. C., and drew attention to the ones liable to importation.

Mr. Tom Wilson, President, 1912-1913, offered his Presidential Address to the members at the evening session. He drew the attention of the members to the establishment of an investigational station under the Dominion Division of Entomology, a fact that will in all probability be accomplished by the spring. He also desired to welcome Mr. Brittain, the recently appointed Entomologist and Plant Pathologist to the Province under the auspices of the Provincial Department of Agriculture. He added his own sorrow to the resolution of commiseration at the recent death of their late President and father of their Society, the Rev. G. W. Taylor of Departure Bay, Vancouver Island. He closed with a feeling of congratulation at the successful resuscitation of the Society and hoped it would continue as successful as this meeting promised in the future,

Mr. Arthur H. Bush followed with an account of the Flora and Fauna that was common to meet with in the mountains at high and arctic elevations. He closed with a wish that the Society not forget the systematic side of entomology in its endeavours to become a force in the Province. Dr. Seymour Hadwen closed the evening session with a lantern slide lecture on Blood-sucking Flies. He was able to establish the fact of the existence at Agassiz of the English Warble fly (*Hypoderma bovis,*) which previously had not been recorded as existing on the North American continent.

Various resolutions were passed, chief among which was a tribute to the life and work of the late Dr. Fletcher. It was decided also to hold a semi-annual meeting of the Society at Vernon during June.

The following officers were appointed for the year 1913;—Hon. President, E. Baynes Reed; President, G. O. Day, F. E. S.; Vice-president, R. S. Sherman ; Secretary, R. C. Treherne; Asst. Secretary, W. H. Brittain. Advisory Board.—G. O. Day, R. S. Sherman, R. C. Treherne, W. H. Brittain, W. H. Lyne, A. H. Bush, Tom Wilson.

The proceedings of the Annual meetings are duly being printed at the cost of 25 cents each copy and can be had on application to the Secretary, Mr. R. C. Treherne, 1625 Nelson Street, Vancouver, B. C. R. C. TREHERNE, SEC.-TREAS.

ENTOMOLOGICAL SOCIETY OF AMERICA.

The seventh annual meeting of the Entomogical Society of America was held in the Normal School, Cleveland, Ohio, December 31, 1912, January 1, 1913. The meetings were all large and enthusiastically attended.

The following list of papers was presented:

C. Betten.—An interesting feature in the venation of *Helicopsyche*, the Mollannidæ, and the Leptoceridæ,

T. J. Headles.—Some facts regarding the influence of temperature and moisture changes on the rate of insect metabolism.

Lucy Wright Smith.—Mating and egg-laying habits of *Perla immarginata* Say,

Alvah Peterson.—Head and mouth-parts of *Cephalothrips yuccæ.*

J. E. Wodsedalek.—Life history and habits of *Trogoderma tarsale*, a museum pest.

Leonard Haseman.—Life cycle and development of the Tarnished Plant-bug, *Lygus pratensis* Linn.

J. F. Abbot.—The strigil in Corixidæ and its probable function.

Victor E. Shelford.—The ontogeny of elytral pigmentation in *Cicindela.*

N. L. Partridge.—The tracheation of the pupal wings of some saturnians.

L. B. Walton.—Studies on the mouth-parts of *Rhyparobia maderiæ* (Blattidæ), with a consideration of the homologies existing between the appendages of the Hexapoda.

James Zetek.—Determining the flight of mosquitoes.

William A. Riley.—Some sources of laboratory material for work on the relation of insects to disease.

Y. H. Tsou and S. B. Fracker.—The homology of the body setas of lepidopterous larvæ.

Anna H. Morgan.—Eggs and egg-laying in may-flies.

Herbert Osborn.—Remarks on the Cicadidæ with special reference to the Ohio Species. 2. Notes on insects of a lake beach.

Edna Mosher.—The anatomy of some lepidopterous pupæ.

Frank E. Lutz.—On the biology of *Drosophila ampelophila.*

E. P. Felt.—Observations on the biology of a blow-fly and a flesh-fly.

C. K. Brain.—Some anatomical studies of *Stomoxys calcitrans* Linn.

Edith M. Patch and William C. Woods.—A study in antennal variation.

Alex. D. MacGillivray.—Propharynx and hypopharynx.

F. L. Washburn.—A few experiments in photographing living insects.

The following officers were elected for 1913.

President.—Charles J. S. Bethune, Ontario Agricultural College, Guelph, Ontario.

First Vice-President.—Philip P. Calvert, University of Pennsylvania, Philadelphia, Pennsylvania.

Second Vice-President.—William M. Marshall, University of Wisconsin, Madison, Wisconsin.

Secretary-Treasurer.—Alex. D. MacGillivray, University of Illinois, Urbana, Illinois.

Additional members of Executive Committee.-Herbert Osborn, Ohio State University, Columbus, Ohio; C. P. Gillette, Colorado Agriculture Experiment Station, Fort Collins, Colorado; Vernon

L. Kellogg, Leland Stanford Jr. University, Stanford University, California; James G. Needham, Cornell University, Ithaca, New York; C. T. Brues, Harvard University, Cambridge, Massachusetts. Nathan Banks, U. S. National Museum, Washington, D. C.

Member of Committee on Nomenclature.—E. P. Felt, New York State Entomologist, Albany, New York.

The Society will hold its next meeting with the American Association for the Advancement of Science at Atlanta, Georgia.

ALEXANDER D. MACGILLIVRAY, Secretary,

BOOK NOTICE.

THE SPIDER BOOK.—A manual for the study of the Spiders and their allies, the Scorpions, Pseudo-scorpions, Whip-scorpions, Harvestmen, and other members of the Class Arachnida, found in America, north of Mexico, with analytical keys for their classification and popular accounts of their habits. By John Henry Comstock. Doubleday, Page & Co., New York.

Spiders have received relatively little attention on this continent from systematic zoologists, considering the large size of the order, the abundance of many of the species in every locality, their exceedingly interesting and varied habits and the important *role* that they play in the economy of nature. The same statement might, indeed, be made to include the whole of the Class Arachnida, but, whereas the other order of the class are less obviously attractive, it is difficult to understand why the spiders have never been favourites.

The "Spider Book," which is an excellent introduction to the study of the Arachnida, and the spiders in particular, is therefore to be welcomed as a most important addition to American arachnological literature, particularly as it is not only adapted to the needs of the beginner, but will doubtless also form a useful book of reference for teachers and entomologists generally.

In the first chapter the general characteristics of the Arachnida and their relationships to other classes of Arthropods are discussed. The characteristics of the various orders are also given, with tables for the separation of the families and genera, and in some cases the species. On account of its great size, the order Acarina (mites and ticks) is necessarily dealt with more briefly than the other groups, only the superfamilies being defined. Less space, for example, is given to this group than to the *Phalangida* (Harvestmen), a much smaller order.

In chapters II. and III. the external and internal anatomy respectively, of spiders, are discussed in considerable detail. A special section of the former is given to the description of the different types of male pedipalps, whose highly-complex structure is of great taxonomic importance, and has been a subject of special investigation by the author. Following the description of the different kinds of spinning glands at the close of chapter III. is a table, giving the names of these glands, with their number, the position of their spinning-tubes, their distribution among the various families and their functions.

Chapter IV. is an account of the life of spiders, and deals with this subject under a number of headings. Much attention is given to the description of the different kinds of silk and their functions, the types of webs, and to the structure and building of the orb type of web. The account of the development is rather brief, the embryological part being omitted altogether. This is, of course, to be expected in a popular work, but the "Spider Book" is more elaborate than popular works usually are, and we therefore think that a brief outline of the early stages of development would not have been out of place, considering the important bearing which the development of some of the organs, such as the book-lungs, tracheæ and spinnerets have upon the phylogeny of the group.

The systematic part of the book, comprising chapters V.-VII., is enlivened by interesting notes on the habits peculiar to the various families and genera, and by the numerous illustrations. Brief descriptions of many of the commoner species are given, as well as keys to all the families and genera inhabiting North America.

The copious illustrations, which are largely photographic reproductions of living or recently killed specimens and their webs and nests, are scattered throughout the text, and give the book a very attractive appearance by reason of their unusual excellence.

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