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PRELIMINARY LIST OF THE MACROLEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, CALGARY.

(Continued from page 42.)

1. *Danaïa archippus*, Fab. A few migrants seen almost every year. June. Have never seen a locally-bred specimen.
2. *Euptoieta claudia*, Cram. Two specimens on Pine Creek, July, 1897, and June, 1900; probably migrants. Lacombe, June 29th, 1900 (Gregson).
3. *Argynnis cybele*, Fab. Not common; very rare in some seasons. In the hills, July and August; Lacombe, June 29th (Gregson). Mr. Elwes has seen this form and considers it correctly named. It resembles *cybele* that I have from Iowa, but is slightly smaller.
- 3a. [*A. leto*, Behr. Recorded by Geddes from Macleod. The record may perhaps refer to *cybele*.]
4. *A. cypris*, Edw. Not common. July and August. Whatever may be the correct name for this species, it is certainly distinct from anything else here listed. Dr. Fletcher calls it *cypris*, and Mr. Elwes says: "It does not agree exactly with any species, but is something between *lais*, *halcyone* and *atlantis*." *Lais* certainly resembles it more closely than anything else occurring near Calgary. I have a ♂, sent me by Dr. Fletcher, labeled *aphrodite* (but without data), which agrees well with my *cypris*, though the black markings in his specimen are slightly heavier. Neither bear any more resemblance to *aphrodite*, sent me from Binghamton, N. Y., than they do to *cybele*. Mr. Snyder treats *cypris* as the Western form of *aphrodite*, and it seems probable that the *aphrodite* recorded from Edmonton, in Northern Alberta, refers to the form I take here. Mr. Gregson tells me that he takes a form at Lacombe which Dr. Fletcher says is "near *cypris*, but

distinct." In his letter to Mr. Gregson, Dr. Fletcher adds: "If about forty of our American species are valid, this also, I think, is a valid species. I have specimens of it from the Rocky Mountains right across the plains to the borders of Ontario." I have reason to believe that he refers to the species which he named *cypris* for me a few years ago.

5. *A. lais*, Edw. Very common. June to August. Also at Banff in Aug. (Sanson). Lacombe "uplands, July, common" (Gregson).
6. *A. electa*, Edw. Not common. July and Aug.; also at Banff (Sanson). Lacombe "uplands, not common" (Gregson). One ♂ and one ♀ out of five ♂♂ and two ♀♀ in my series have been labeled *electa* by Mr. W. H. Edwards. Here I suffer sadly from lack of material, as, though the form is far less common than *lais*, I could long ago have obtained a good series, had it not been for pressure of other business during its season. I have *atlantis* ♂ from Prince Edward Island, which I cannot distinguish on the upper side from Calgary *electa*, though on under side of secondaries the spots are slightly larger, the buff submarginal band distinctly narrower, and ferruginous area more rusty reddish than in most of my short series. A ♂, sent me from Banff by Mr. Sanson, and named *electa* for him by Dr. Fletcher, is almost an exact counterpart of my P. E. I. *atlantis*, though smaller than it or any of my *electa*; whilst *atlantis* ♀, also named by Dr. Fletcher, from Mr. Gregson, of Lacombe, differs from a Calgary ♀, labeled *electa* by Mr. Edwards, only in being slightly larger. A worn ♂ which I took at Laggan last August seems to come nearer the P. E. I. specimen than does anything I have taken near Calgary. The species, whatever it is, is slightly darker than *lais*, the markings altogether heavier, and dusky brown basal area above darker and wider in extent. The veins above on primaries are also much more broadly clothed with black scales than in *lais*. On the under side the differences are less pronounced, though the ferruginous area on secondaries is usually, though not always, paler in *lais* than in the other form. The above remarks apply to the ♂♂. I have only seven ♀♀ belonging to either form, and must confess my difficulty in deciding where to place them. *Atlantis*, which is recorded by Geddes from the Rocky

Mountains of Alberta, may eventually prove to be the correct name for the species, or it is even barely possible that I may have eventually to bracket my *electa* with *lais*, but at present I certainly have no evidence to justify the placing of Alberta *atlantis-electa* material under two names.

7. *A. monticola*, Behr. Banff. August.
8. *A. halcyone*, Edw. Probably not rare in the foothills. I have examined altogether seventeen specimens, all ♂♂, taken by Mr. Hudson, who says it occurs both near Billings's lumber mill and Lineham's lower log camp. All these bear date of July 12th, though taken in different years. He also took a single ♂ near the head of Pine Creek, on July 7th, 1896, but the species has not been met with elsewhere east of the spruce. In this we have, judging from the verdicts of Drs. Skinner and Holland, a form referable to either *halcyone* or *coronis*. Allowing for the usual sexual differences, my form agrees fairly well with the figure of *halcyone* ♀ in Mr. Edwards's Butt. N. Am., except that none of my specimens have the rosy tinge on under side of primaries, and the silver spots in second row (of secondaries) are of less uniform shape than in the plate, and the ferruginous area in no case quite as dark. Many of my specimens have a decided tinge of green, noticeable only in certain lights. I have not seen his plate of the ♂. I sent a specimen to Dr. Skinner as *halcyone*, which he considered correct. I had sent the species to Dr. Holland, before seeing Edwards's figure of ♀ or receiving Dr. Skinner's opinion. I quote Dr. Holland's words: "It might as well be *coronis* as anything else. I have a specimen from Mt. Judith, Montana, in the Edwards collection, which agrees exactly with your specimen." The black markings above in the Pine Creek specimen are much heavier, and the basal area darker, than in any of those taken further west.
9. *A. Nevadensis*, Edw. Very common everywhere. July and August. It seems probable that past records of *Nevadensis*, *Edwardsii* and *Meadii*, from Alberta, all refer to one species. I have examined a large number of specimens of both sexes, taken from the mouth of Pine Creek to the foothills, and from Calgary to Sheep Creek, as well as some taken by Mr. Gregson at Lacombe,

and believe them to be all one species. As compared with the plate of *Nevadensis* ♀, in Vol. III. of Mr. Edwards's Butt. N. Am., all the ♀ ♀ I have seen are larger and darker above. The silver spots are generally more elongated, and the reddish area on primaries beneath generally brighter, especially near the base, but in some specimens almost lacking, or confined to the mere bordering of the veins. In a few ♂ ♂ this reddish tinge is absent. The shade and intensity of the green is extremely variable. One of my specimens is labeled "*Nevadensis* ♀" by Mr. Edwards himself. The specimen has lost its abdomen, but I believe it to be a ♂. I have compared specimens from Lacombe, called *Edwardsi* by Dr. Fletcher, with the south of Calgary form, and can see no difference. Dr. Skinner has seen the species, and says: "The specimens you send are certainly not *Edwardsi*, nor are they true *Nevadensis*: nor are they exactly like the Colorado *Meadii*, but they come nearest to *Meadii*." It is worthy of note that the great majority of my specimens of this species are ♀ ♀. In every other species of *Argynnis* occurring here, the proportion of ♂ ♂ taken will exceed the ♀ ♀ by at least five to one.

10. *A. carynome*, Edw. Very common everywhere. July and August.
 Var. *clio*, Edw. Not rare, and widely distributed south of Calgary. Banff (Sanson). Mr. Gregson says it is extremely local at Lacombe. I have a specimen, which Mr. Edwards called an "unsilvered" *Nevadensis*, which I believe to be ♀ *clio*, and Mr. Elwes supports me in this view.
11. *A. myrina*, Cram. Locally common. Calgary and Lacombe, July and August. Banff, June 17th (Sanson).
12. *A. tricharis*, Hüb. Not rare locally, on marshy ground near the spruce timber; July. Banff, June 3rd (Sanson); Laggan (Bean); Lacombe, very local (Gregson).
13. *A. chariclea*, Schneid. Very common in the mountains and as far as the eastern limit of the spruce. I believe the form is referable to *Boisduvalii*. Mr. Elwes has taken it himself at Laggan, and considers *Boisduvalii* and *chariclea* to be synonymous.
14. *A. freija*, Thunb. Common everywhere in the hills near Calgary, preferring hillsides amongst dwarf willow bushes; May (earliest

- record April 30th); Banff (Sansou); Lacombe, common everywhere (Gregson).
15. *A. frigga*, Thunb., var. *saga*, Kaden. Common in much the same localities as *chariclea*, occurring at Laggan, and eastwards nearly to Calgary. Also at Lacombe (Gregson), June.
 16. *A. bellona*, Fabr. Common everywhere, end of May and June. Partially double brooded near Calgary, the second brood appearing in fewer numbers towards the end of August.
 17. *A. alberta*, Edw. Mr. Bean is familiar with the habitat of this species, on mountain tops near Laggan. July?
 18. *A. astarte*, Doubl.-Hew. Mountain tops near Laggan (Bean). I saw several specimens there myself on August 8th of last year (1900), on, and a few hundred feet below, the summit of Slate Mt., about three miles south-east of Laggan station. Its habits are aptly described by Mr. Bean in Vol. III. of Edwards's Butt. N. Am. I certainly found its flight to be "exceptionally swift," and even when it did not disappear over the edges of cliffs, I found it impossible to keep it in view for more than a few seconds whilst on the wing. I succeeded in taking one ♂—the only specimen I saw settle—which was doubtless the easier to net owing to its badly-worn condition. I took a badly-worn ♂ on the top ridge of Sulphur Mt., Banff, on August 12th, at an altitude of about 7,200 ft., and saw several more. I have since seen a ♂, evidently in splendid condition when taken, captured by Mr. Sansou near the same spot on June 27th, 1900. This measured 40 mm. in expanse, which is smaller than the size mentioned in Mr. Edwards's work. I hear, on good authority, that the species was taken near the Devil's Lake, about ten miles north-east of Banff, in 1898.
 19. *Melitæa anicia*, Doubl.-Hew. A single ♀, rather worn, was taken by Mr. Hudson in the foothills near Lincham's lower log camp, on the south fork of Sheep Creek, about forty miles south-west of Calgary, on July 12th, 1896, at about 5,000 feet. I took several specimens (var. *Beauii*, Skinner), in indifferent condition, on August 8th, 1900, at Laggan, but did not meet with it below the timber line (about 7,000 ft.). I took it a few days later on Sulphur Mt., Banff, but scarcely below 6,000 ft. One specimen

- appeared to be quite fresh. Mr. Sanson's records for Banff are May 29th and June 18th.
20. *M. Whitneyi*, Behr.? A single ♂, in fine condition, taken by Mr. Hudson in the spruce near Billings's lumber mill, on July 5th, 1896, is probably either this species or *palla*, Bd., which is recorded from the Crow's Nest Pass by Geddes.
21. *Phyciodes ismeria*, Bd.-Lec. Common at Lacombe; June (Gregson).
22. *P. tharos*, Dru. Common everywhere. June to September.
23. *P. pratensis*, Behr. Common on the hill-prairie near Calgary, June to August; Banff (Sanson).
- 23a. [*Phyciodes* sp? A single ♀ near Lineham's lower log camp, July 13th, 1896, which I have been unable to identify. It may be an aberrant *pratensis*.]
24. *Grapta satyrus*, Edw. Fairly common; Calgary and Banff.
25. *G. faunus*, Edw. Not common; Calgary and Banff.
26. *G. zephyrus*, Edw., vel. *progne*, Cram. Common, apparently everywhere.

} July to September.

Here I must confess myself somewhat at sea in the matter of species, though I have made a careful study of all the scanty material I could obtain, including specimens kindly lent me for the purpose by Mr. Gregson and Mr. Sanson. A specimen sent me from Banff as *satyrus*, on the authority of Dr. Fletcher, resembles a Calgary specimen labeled "Like *satyrus* in Elwes's collection"; and *zephyrus*, named for me by Dr. Holland, agrees with *zephyrus* named by Dr. Fletcher from Banff, and with a Calgary specimen labeled "Like *zephyrus* in Elwes's collection." *Progne* is the name given to a Calgary specimen of the same form by Mr. W. H. Edwards, and to a similar Lacombe specimen by Dr. Skinner. Mr. Bean used to take a species at Laggan which he called *zephyrus*, and I have placed the form under that name. *Satyrus* differs from this form in having larger black spots, darker basal area above, and usually, though not constantly, larger submarginal yellowish blotches. Beneath, both forms are very variable, both in colour and shape of band and strigations, and in the shape of the white discal spot. The colour in *zephyrus* is

usually varying shades of gray, and discal spot is a fairly well rounded G or C. In *satyrus*, the colour is chocolate brown, and the spot usually a distinctly angulated L, though sometimes rather rounded and more resembling C. I am not yet fully satisfied as to the distinctness of these forms; nor yet of *faunus*, which has been applied by Dr. Fletcher to a Banff specimen, well duplicated by one from near Calgary. Above it is nearest to *satyrus*, but smaller; beneath it is almost intermediate between that and *zephyrus*, but shows greater contrast in shading than either. The green submarginal spots (beneath) are present, as occasionally in *zephyrus*, though brighter than in that form, and the white mark is of much the same type.

27. *G. f-album*, Bd-Lec. A single specimen on Pine Creek, Aug. 25th, 1898. One more seen. Banff, August 8th (Sansou). Lacombe, August, scarce (Gregson).
28. *Vanessa antiopa*, Lin. Common everywhere. July to May.
29. *V. Californica*, Bd. One worn specimen on Pine Creek, June 25th, 1900; probably a migrant.
30. *V. Milbertii*, Godt. Common everywhere, and on the wing from April to September. Fresh specimens to be seen from July onwards.
31. *Pyrameis atalanta*, Lin. Usually very rare. My only records are June 22nd and Aug. 4th. It was not uncommon in 1900—a great year for migrants. Lacombe, July 1st, 1900 (Gregson).
32. *P. cardui*, Lin. Common some seasons, notably in 1900. Worn specimens seen towards the end of May, but I doubt whether it hibernates here; full-grown larvæ on June 10th.
33. *Limenitis arthemis*, Dru. Common in the hills. I have taken it as far east as the mouth of Pine Creek. End of June to August. Lacombe (Gregson); Anthracite (Sansou).
34. *Cænonympha inornata*, Edw. (= *ochracea*, Edw.?). Very common everywhere in the hills near Calgary and also on the level prairie. Lacombe, common (Gregson). June and July. A small portion of a second brood in September. I have both names from Mr. W. H. Edwards, but I have examined a large number of specimens and cannot recognize two species.

35. *Erebia discoidalis*, Kirby. Common, especially in the hills; also at Lacombe and Banff. May (earliest record, April 30th).
36. *E. disa*, var. *manicinus*, Doub. Hew. Lacombe, in a tamarack swamp, fairly common. May (Gregson). Mr. Elwes is the authority for the name. Mr. Sanson records it from Banff. It probably occurs there, but the specimens he sent me under this name were the following species.
37. *E. epipsodea*, Butl. Very common everywhere. June and July.
Var. *Brucei*, Elwes? A single specimen of this var., or something very like it, taken at the head of Pine Creek, is in the collection of Mr. Elwes. I have never seen another.
38. *Satyrus alope*, form *nephele*, Kirby. Very common around Calgary and Lacombe. July. I have specimens labeled both *olympus* and *ariana* by Mr. Edwards.
39. *Chionobas Macounii*, Edw. Decidedly rare and very erratic in appearance. June and July. Has been taken near Calgary, Red Deer, and Morley. For further notes on this species, vide CAN. ENT., XXX, p. 298, et seq. In addition to the records there given, a single specimen was seen in 1900 in the spruce near Billings's lumber mill.
40. *C. phryxus*, Doub. Hew. Banff and Laggan. June to August. Have never seen it anywhere near Calgary.
41. *C. alberta*, Elwes. Usually very abundant on the prairie around Calgary. Far less common near the spruce limit. May and June (earliest record, May 3rd). Extremely variable in colour, mesial band on secondaries, and number of ocelli. I have specimens of both sexes without ocelli. No records from Banff or Lacombe. The validity of this species has long ago been fully established by both Mr. Elwes and Mr. W. H. Edwards. A treatise dealing fully with the form would occupy too much space here; but, for the benefit of those who still have difficulty in distinguishing it from *zaruna*, it may be pointed out that the mesial band on primaries beneath, sharply toothed outwards below the cell—the tooth being invariably visible from above—as well as the usually conspicuous whiteness of the veins on secondaries, are comparatively safe guides by which *alberta* may be distinguished from the following species. The safest guide of

all is perhaps that "general appearance" which is so hard to define.

42. *C. zaruna*, Edw. Very common around Calgary, especially on the level prairie, and occurring as far west as Kananaskis (Macoun); Lacombe (Gregson). June and July (earliest, May 14th). A larger and brighter coloured species than the preceding, and perhaps even more variable; also differing somewhat in manner of flight, owing, probably, to greater strength of wing.
43. *C. jutta*, Hubn. Common in spruce woods near Calgary in June. Also at Laggan. It probably occurs at Banff, though I have no record from there.
44. *C. Beauti*, Elwes. Mountain tops, near Laggan (Bean). I took a fresh, but crippled, ♂ there myself on Aug. 8th, 1900.
45. *Thecla humali*, Harris. A single specimen brought to me in 1894, taken on the level prairie about twelve miles south of Calgary, near the mouth of Fish Creek. I see no reason why it should not be locally common.
46. *T. angustus*, Kirby. Common. May and early June. Also at Banff (Sansou).
47. *T. irus*, Godt. Locally common near Calgary.
48. *T. eryphon*, Bdl. A few specimens near Billings's lumber mill. Early June. Banff, May 24th (Sansou).
49. *T. dumetorum*, Bdl. Mr. Elwes tells me he took a specimen of this species in the foothills, about 50 miles S. W. from Calgary (about May 12th, 1895?).
50. *T. titus*, Fab. Rare and local in the hills around Pine Creek. Very common in foothills near Lincham's lower log camp. August. Lacombe, July 28th, fairly common (Gregson).
51. *Chrysophanus xanthoides*, Bdl. Very rare. Head of Pine Creek, July.
52. *C. thoe*, Bdl. Locally common on low, wet ground amongst the hills on Pine Creek. July.
53. *C. mariposa*, Reak. Common near the spruce. Also at Banff and Laggan. July and Aug.
54. *C. helloides*, Bdl. Common. June and July. A second brood in far fewer numbers in September. Both Mr. W. H. Edwards and Dr. Fletcher refer my form to *florus*, Edw. I have specimens in

- my series agreeing well with specimens sent me by Mr. Lyman as typical *heloïdes*, labeled "California and Washington."
55. *C. phleas*, Bd.-Lec. Taken on July 5th and 12th, 1896, by Mr. Hudson, both near Billings's lumber mill and Lineham's lower log camp on Sheep Creek. In all, six specimens in fine condition. It is probably locally common. Dr. Holland has three of these specimens. He says: "They are undoubtedly *phleas*, the European form, closely corresponding with specimens which I have from Turkestan on the upper side, but show some modifications on the under side that are of interest. . . . I have no doubt that *C. Americana* grades over into *phleas*, and that when we come to know all about the distribution of the species, we shall see that our eastern *Americana* is a local race of the European species, and our north-west country will undoubtedly furnish us with the connecting links between the palearctic and nearctic forms."
56. *C. Snowi*, Edw. Laggan, in August (Bean). I took a worn specimen there myself on August 10th, 1900, at about 7,000 feet.
57. *C. sirius*, Edw. Recorded in Holland's "Butterfly Book" from Macleod.
58. *Lycæna fulla*, Edw. Common, end of June and July. Lacombe, June 16th, local (Gregson).
59. *L. swpiolus*, Bd. Common, end of May to early July. Also at Banff and Laggan.
60. *L. Couperii*, Grote. Extremely common everywhere. On the wing from the end of May, nearly all summer. Probably two broods at least. Earliest record, May 12th. Mr. Elwes tells me that this is the Calgary form of *antiacis*, Bd.
- 60a. [*L. lygdamus*, var. *oro*, Scud. Mr. Gregson has shown me Lacombe specimens which Dr. Fletcher thinks are referable to this species. In some of them the spots beneath are almost wanting, but though I cannot exactly duplicate them in my Calgary series of *Couperii*, I doubt their distinctness from that species. I certainly cannot distinguish the specimens standing in Mr. Sanson's collection as *lygdamus* from *Couperii*.]
61. *L. sagittigera*, Feld. A single ♂, perfectly fresh, on June 19th, 1900, in the poplar woods at head of Pine Creek.

62. *L. rustica*, Edw. Common everywhere. June and July.
63. *L. shasta*, Edw. A single specimen on the Bow bottom, near the mouth of Fish Creek, on June 21st, 1894. The name is on the authority of Mr. W. H. Edwards. Visits to the locality since have failed to produce any more.
64. *L. melissa*, Edw. Common, end of May to August. A remarkably variable species. I have had the names *Scudderii* and *Anna* from Mr. Edwards, and have seen Banff specimens, labeled *Scudderii* by Dr. Fletcher, which agree with specimens in my series. I picked out some half dozen specimens showing the range of variation as much as possible and sent them to Dr. Skinner, who wrote: "They are all undoubtedly one species, and are a little off typical *melissa*, and near to var. *Annetta*." Mr. Gregson takes the same species at Lacombe. Judging from Mr. Edwards's opinion about certain forms I sent him, it is not unreasonable to suppose that the record of *Anna*, Edw., from Belly River, refers to this species.
65. *L. acmon*, Doub.-Hew. Banff, Aug. 7th (Sanson). I have seen this species, and believe it to be distinct from anything else here listed.
66. *L. pseudargiolus*, Bd.-Lec. I have a specimen taken by Mr. Elwes within a mile of my house, on May 24th, 1895, but neither Mr. Hudson nor myself have ever taken it. Mr. Gregson records vars. *marginata*, Edw., and *lucia*, Kirby, from Lacombe (end of May, not common), and Mr. Sanson says he takes var. *lucia* at Banff (May 25th).
67. *L. amyntula*, Bd. Common in June, especially near the spruce. Lacombe, in river bottoms, June, not common (Gregson). I have seen Lacombe specimens which Mr. Gregson has under *comyntas*, but cannot separate them from what I have as *amyntula*.
68. *Pieris sisymbri*, Bd. Rather rare on Pine Creek. May and June. Also at Banff and Laggan.
69. *P. protodice*, Bd.-Lec. June and August. Double brooded, the second brood being fairly common. The commonest form here agrees with *protodice*, as described in French's "Butterflies of the Eastern U. S. and Canada," but Dr. Fletcher gave me the name *occidentalis* for this form, which is also like *occidentalis*

mentioned in Holland's "Butterfly Book." *Protodice*, as there described, has secondaries beneath immaculate white in the ♂. This form occurs here rather sparingly. Scudder, in his "Brief Guide," treats them as one species, and though I doubt their distinctness, I have not sufficient local material at hand to form a definite opinion. Mr. Gregson reports *protodice* from Lacombe, "July 27th, uplands, scarce." *Occidentalis* occurs at Banff August (Sanson).

70. *P. napi*, form *oleracea*, Harr. Fairly common; single brooded only, June and July. Mr. Edwards calls my form "*oleracea*, form *virginiensis*." It is somewhat variable, the variation probably ranging between the two forms. Mr. Gregson reports *oleracca-hiemalis* from Lacombe. "July, rather common in meadows and gardens." Mr. Sanson reports *oleracca* and *venosa* from Banff. I have seen a ♀ from Banff, dated May 3rd, which is darker than *bryonia*, Ochs., in Holland's book.
71. *P. rapæ*, Lin. Two specimens taken: ♂, July 20th, 1899; ♀, June 26th, 1900. No more observed.
72. *Anthocharis ausonides*, Bd. Common on the hill-prairie, end of May and June. Banff, May 17th (Sanson); Lacombe, July 19th, woodlands, scarce (Gregson).
- 72a. [*A. creusa*, Doub.-Hew. I have seen a Banff specimen, dated June 15th, agreeing closely with plate and description of *creusa* in Holland's "Butterfly Book." I refrain from listing it as an undoubtedly distinct species. One out of a large series of Calgary *ausonides* comes very near this specimen on the under side.]
73. *Colias elis*, Streck. Laggan (Bean); Banff, taken by Mr. H. H. Lyman and Mr. H. K. Burrison in 1890 (Bean). It cannot be common there, as Mr. Sanson does not record it. Mr. A. F. Hudson took two fine ♂♂ in the foothills at the "Lineham's lower log camp" locality on July 12th, 1896. According to Mr. Bean, the record of the *Meadii*, by Geddes, from the Kicking Horse Pass, probably refers to *elis*.
74. *C. eurytheme*, Bd. Lacombe, fairly common; August (Gregson). Common on Pine Creek in June, 1900, though not observed near Calgary in previous years. The unexpected appearance of

true *curythene* in considerable numbers here last June is a mystery, as it is extremely unlikely that amongst the large numbers of *christina* and *eriphyle* taken by Mr. Hudson and myself during the previous seven seasons, we should never before have taken anything resembling *curythene* had it occurred here annually. *Eriphyle*, which is here a very much smaller and pale lemon-yellow form, was flying at the same time, as well as *christina*, but *curythene* was not observed when the second brood of *eriphyle* appeared as usual in August. They agree well with *curythene*, from S. Dakota, and specimens have been submitted to Dr. Skinner for examination, so there is no doubt as to their identity. Of about 20 specimens taken, all except two ♀♀ show signs of much flight, and I at first thought they might be migrants; but Mr. Hudson, their captor, tells me that they were on the wing here for some time before he noticed that they were not *christina*. Of seven or eight ♀♀ taken, three were albinos.

Var. *eriphyle*, Edw. Very common; end of May and June, and again in August. I have taken fresh specimens in July. Also at Lacombe (Gregson) and Banff (Sansou).

75. *C. christina*, Edw. Common; June and July. Lacombe, August (Gregson) and Banff, August (Sansou). The pale lemon-yellow form of the ♂ is rather rare near Calgary, but is, I believe, more common in the mountains. The ♀♀ show most extraordinary variation. It is hard to find two alike. I have a specimen, I believe sexually a ♀, having the right side normal, of the pale, almost immaculate yellowish white variety, and on the left side showing a tendency to become an orange ♂, in having irregular dashes of orange in several places on both wings, and patches of distinctly ♂ brown marginal band near the apices.

75a. [*C. occidentalis*, Scud. Lacombe in August, fairly common (Gregson). The name is on the authority of Dr. Strecker. Mr. Gregson sent me three ♂♂ and one ♀ as *occidentalis*. The ♀ and one ♂ I believe to be *christina*. The other two ♂♂ are certainly very near *christina*, but differ in more than one respect from any form of that species that I have taken near Calgary. Until I can examine more material, this form must stand as doubtful.]

76. *C. pelidne*, Bd. Apparently fairly common in the spruce in July.

Dr. Holland writes: "Your specimen agrees positively, point for point, line for line, and dot for dot, with a specimen labeled in the Edwards collection as *C. interior* ♂, coming from Godbout Bay, though both this specimen and yours strike me as being somewhat off type." Dr. Skinner says: "It comes nearest to *interior*, or perhaps *eriphyle*." Mr. Elwes says it "belongs to the *pelidne* group." He writes later concerning the species: "Some forms are locally constant. . . . Yours is near, and perhaps runs into, *christina*." It certainly is near *christina*, but, so far as I have observed, remarkably constant in colour, which *christina* is not. I have not often had a chance of taking it, and have only two ♀ ♀, very much alike, and differing from any ♀ *christina* that I have taken nearer home. The first time I took the species I took ♀ ♀ flying with *pelidne* ♂ ♂, and submitted both sexes to Mr. Elwes, who questioned their unity. As I saw no *christina* ♂ ♂ on that day, I believed them to be one; but the subsequent receipt of the two above mentioned ♀ ♀ from Mr. Hudson convinces me that the original ♀ ♀ taken were not of this species.

Var. *Skinneri*, Barnes., = *C. minisni*, Bean, MSS. Common at Laggan. I took ♂ ♂ in fine condition there on August 8th and 10th of last year, between 5,500 and 7,000 feet, but saw none either higher or lower. It may certainly be a small and locally constant var. of *pelidne*, but I find it hard to associate it thus closely with what I have as that species. The discal spot on primaries in all my *minisni* is more narrowly linear, the marginal band narrower, and secondaries and basal area, as well as the under side, more widely sprinkled with black scales.

77. *C. nastes*, Bd. Laggan, above timber (Bean). I was fortunate in taking four ♂ ♂ and two ♀ ♀ of this species, in fine condition, during my short stay at Laggan last August. I met with it at about 7,000 to 7,600 feet, on Slate Mountain, on August 8th. Two days later I took a fine ♂ on "Saddle Back," near Lake Louise, flying with *minisni*.

78. *Parnassius smintheus*, Doub.-Hew. Mr. Hudson took over a dozen specimens, both sexes, on July 12th, 1896, at Lineham's lower camp on Sheep Creek, where he says it was abundant. It

- occurs at both Laggan and Banff. My ♀♀ (from Sheep Creek) are slightly darker than the figures of *smintheus*, in Vol. III. of Mr. Edwards's work, but not so dark as *hermodur*.
79. *Papilio zolicaon*, Bd. On the hill-prairie around Pine Creek; not common; June. Also at Olds (Willing).
80. *P. nitra*, Edw. Fairly common on the hill-prairie and in river bottoms. End of May and June. Also at Olds (Willing). I have a Calgary specimen labeled *asterias* by Mr. Edwards, but both Dr. Fletcher and Dr. Holland agree in referring the species to *nitra*.
81. *P. turnus*, Lin. Fairly common everywhere. June.
82. *Carterocephalus palamon*, Pall. Fairly common locally near the spruce in June. Laggan (Bean); Banff, June 5th (Sansons); Lacombe, July 19th, not common (Gregson).
83. *Thymelicus garita*, Reak. Common on Pine Creek.
84. *Pamphila comma*, var. *Manitoba*, Scud. Common near Calgary. End of June to August. Have taken it at Banff in August, var. *Assiniboia*, Lyman. Far less common than *Manitoba*.
85. *P. uicos*, Edw. Far less common than the preceding species. June and July.
86. *P. draco*, Edw. Rather rare near Calgary. July. I took a specimen at Laggan in August.
87. *P. peckius*, Kirby. I have a single ♀ labeled "Pine Creek," but bearing no date, called *peckius* by Mr. Lyman, and agreeing with *peckius* from Ottawa. I have rather neglected the *Pamphilas*, and some species may be more common than I suppose.
88. *P. mystic*, Scud. Fairly common on the hill prairie; June and July.
89. *P. cernes*, Bd.-Lec. Probably local, and apparently not very common, though I have no records of exact localities.
90. *Pyrgus tessellata*, Scud. By no means common; end of June and July. Mr. Gregson records *montivagus* from Lacombe. I have not seen his species, but suspect that he refers to *tessellata*.
91. *P. coepitalis*, Bd. Banff; June 3rd (Sansons). I have seen this species.
92. *Nisoniades icelus*, Lint. Common everywhere around Calgary; middle of May to end of June. I have the name *briso* from Dr. Fletcher, but have carefully examined a large number of specimens, and

find the pencil of hairs present on hind tibiae in all. Dr. Skinner's report on specimens that I have sent him convinces me that I do not take *brizo*.

93. *N. persius*, Scud. Common everywhere around Calgary. Also occurs at Banff (Sanson), middle of May and June. Dr. Fletcher labeled a specimen I sent him "*lucilius*, I believe," but Dr. Skinner, who has both species named by Dr. Lintner, considers my form *persius*. Mr. Gregson records *lucilius* from Lacombe. As Dr. Fletcher probably gave him the name, I suspect that the species he takes there is *persius*.
94. *Eudamus pylades*, Scud. Local and not common. Has been taken at head of Pine Creek and near Billings's lumber mill. June.

(To be continued.)

HOW TO GET RID OF FLEAS.

Reading in the April number of the CANADIAN ENTOMOLOGIST, Mr. Heath's account of the plague of fleas in Manitoba, recalled what I had read in the *Agricultural Gazette* of New South Wales. It appears that in the Australian bush fleas are as great a nuisance as they are in some parts of Manitoba. A settler, who had suffered greatly from their presence, wrote to the *Gazette* that he had occasion to use tar paper in his dwelling, when he discovered that fleas would not stay in the house with it, and from that time he had no more trouble with fleas in his house, although they were as plentiful out of doors as ever. Last autumn, or early winter, one of our local members, on his regular visit to the Society's room, started the enquiry as to what was the best way to get rid of fleas, as his house had got overrun with them from having allowed their dog to sleep in the cellar. I thought of what I had then recently read, hunted up the number of the *Gazette*, found the reference, and showed it to him, when he said he would try it. The next time he called he reported that it had "worked like a charm," and he at once got rid of the fleas. So here seems to be a clean, cheap, and, so far as tested, an effectual means for those afflicted of getting rid of the cause of great discomfort.

J. ALSTON MOFFAT.

NOTE ON THE RESPIRATION OF ALEURODES CITRI.

BY C. W. WOODWORTH, UNIVERSITY OF CALIFORNIA.

The effort to control the "white fly" of the orange (*Aleurodes citri*) by hydrocyanic acid gas, naturally suggested an inquiry into the respiration of these insects. The author was enabled to pursue this inquiry, while recently in Florida, under the auspices of the Florida Agricultural Experiment Station.

The only account of the organs of respiration in the young of this family is a brief note with a figure in Burmeister's Handbuch, which is very incomplete and not entirely accurate. Some very interesting and quite unique features are presented by these insects, not the least of which are the breathing folds, that are very conspicuous structures, and have been heretofore incorrectly interpreted. The view suggested by Riley and Howard (*Insect Life*, 1893, Vol. 5, pp. 219-226), that the anterior folds represent the original division between the head and thorax, is the one usually accepted. In reality they are wholly thoracic in position, being nearer to the pro-mesothoracic line than to the head-thoracic boundary, and they are by no means vestigial structures, but specially developed organs of respiration.

The necessity of these organs is very evident when it is noted that the spiracles open ventrally, and that the body is cemented to the leaf. The insect is nearly transparent, and very inconspicuous as it lies upon the leaf, but if the leaf is bent so that air is admitted beneath it, the insect immediately becomes whitish. An examination of the inverted insect under the microscope shows the ventral surface to be marked off into polygonal areas, with many round regions resembling glands. These correspond exactly with the cells and stomata of the leaf, and are, in fact, a mould of the surface upon which the insect rested, produced doubtless by the hardening of the secretions of the marginal glands.

The breathing folds are the only passages between the outside air and the spiracles; and they are really structures showing quite high specialization. The surface of the lumen of the groove is armed with minute scattered chitinous papillæ, and thus differs strikingly from the structure of any other part of the skin of the insect. The outer opening is guarded by a pair of oblique combs. They are produced by a modification of the serrations that elsewhere form the border of the body, and recall the guard-combs

developed at the opening of the spiracles in many insects ; they evidently serve the same function. The body of the insect is so thin that towards the edge its dorsal as well as its ventral wall is involved in the production of the fold. The inner ends of the breathing folds enlarge into conspicuous chambers, since each fold serves for more than one spiracle.

There are four pairs of spiracles present in the young of an Aleurodid, though Burmeister recognized only the anterior two pairs. He saw, indeed, the anal pair, but incorrectly identified them as sexual orifices, which he describes as being on either side of the anal opening. At this stage there are no vaginal openings, though the eggs can be clearly seen quite fully formed just anterior to the anal pair of spiracles long before the final moult. The anal opening is on the dorsal surface, and therefore really very far distant from the ventrally placed spiracles.

The anterior folds are opposite the anterior pair of spiracles, which lie between the bases of the developing front and middle legs ; these project in regular curves in nearly opposite directions. The tips of the rudiments of the middle legs reach nearly to the base of those of the hind legs ; in these intervals lie the second pair of spiracles. The third pair of spiracles lie just beyond the tips of the rudiments of the hind legs. All these are served with air by the anterior breathing folds, the three spiracles on each side opening into the three-chambered basal enlargement of the fold on that side. The fourth pair open on a Y-shaped expansion of the anal breathing fold.

The main portion of the tracheal system consists of a ventral trunk on either side reaching from the anterior to the posterior spiracle, two dorsal girdles connecting with each other the spiracles of the anterior two pairs, and on either side of the abdomen and metathorax a dorsal trunk reaching forward from the anal spiracle to about half way between the second and third pairs of spiracles, where they unite with the ventral trunks. Burmeister recognized the anterior portion of the ventral trunk and the dorsal girdles, and figures them quite accurately, but he did not make out the whole system.

The finer branches are given off as follows : The anterior spiracles lead into a trunk that almost immediately divides into two main branches, one of which quickly subdivides into about thirty-four long twigs, which spread out fanlike and serve the sides of the body from almost the middle line of the front around the sides to about the middle of the thorax. The

other main branch at once gives off the anterior dorsal girdle, and soon after divides into two about equal branches, one of which is the ventral trunk, and the other proceeds directly towards the mouth. This cephalic trachea divides into two main branches, the dorsal one of which subdivides into about eight long convoluted tubes that supply the sides of the head, the other proceeding almost to the mouth-opening, sweeps around in a conspicuous curve of over 90° , and then, breaking up into about three twigs, continues straight forward to the edge of the body.

The trunks from the second pair of spiracles divide each into two main branches, each of which gives off a small branch, the lower anteriorly and the upper posteriorly; these branches at once divide into a small number of convoluted twigs serving the immediately adjacent viscera. The ventral branch proceeds to the ventral trunk, and the dorsal forms the dorsal girdle. The third spiracle opens into a trunk that immediately divides into an external and an internal branch. The external branch soon separates into an anterior and a posterior division, each of which breaks up into about twelve long twigs, serving the edge of the body along the posterior part of the thorax and anterior part of the abdomen. The internal branch proceeds to the ventral trunk, but first gives off a small branch, which serves the adjacent viscera with about five convoluted twigs. The anal spiracles are nearly as large as the anterior ones. From each arises a ventral and a dorsal trunk, and at the point of separation a third main branch at the side. From this branch arise successively a series of about twenty-five long twigs serving the sides of the abdomen. Besides these tracheæ there are a few convoluted visceral branches given off from the trunks as follows: About eight on the anterior dorsal girdle, the same number on the anterior section of the ventral trunk, two on the middle division, and about eight in the posterior section, and the dorsal trunk gives rise to about four in the abdomen. These branches, counting those on the two sides of the body, amount altogether to about 264 twigs. The finer tracheæ divide rarely, if at all, and are quite constant in their numbers.

Some of the most striking points in this tracheation are: The sharp distinction both in structure and origin of the visceral and lateral twigs; the fact that the twigs from one spiracle rarely invade the territory occupied by those of another; and, most peculiar of all, that the twigs

from the second pair of tracheæ do not serve the border at all, but confine themselves to the region of the developing imaginal appendages.

The withdrawal of the spiracles so far from direct contact with the outer air produces a condition of isolation that should influence the results of experiments with such material as hydrocyanic acid gas. Such was found to be the case. While the insect is quite easily killed by rather smaller charges than is considered necessary for efficient work with scale insects, the time of exposure required is distinctly longer. It at least suggests the possibility that considerable time is necessary for the diffusion of the poison through the air of the breathing folds before reaching the body.

INSECTARY REARINGS OF TWO SPECIES OF MORDELLISTENA.

BY F. M. WEBSTER, WOOSTER, OHIO.

Mordellistena pustulata, Mels., was reared June 6th, 1899, from stems of *Ambrosia trifida*, Giant Ragweed, collected October 13th, 1898. From the same species of plant collected November 10th, 1899, this insect was reared April 4th, May 12th and 31st, 1900.

Mr. Coquillett has found larvæ of this species in plant stems, under circumstances that render it highly probable that they were feeding on Lepidopterous larvæ. The stems of the Giant Ragweed are populated by Lepidopterous, Dipterous, Coleopterous and Hymenopterous larvæ. In my case only by Coleopterous and Hymenopterous larvæ.

Mordellistena limbalis, Mels., was reared March 16th, 1901, from thorns of the Honey Locust, collected February 20th, 1900. No other insects had been reared from these thorns.

Mr. Schwarz thinks that the larvæ of *Mordellistena Floridensis* live in the stems of plants, deriving their nutriment therefrom; while Mr. Osborn found similar larvæ probably feeding on Dipterous larvæ, and also in plant stems.

MR. A. W. HANHAM has recently been removed from Winnipeg. His address is now: Bank of British North America, Victoria, B. C.

SOME ORIGINAL DESCRIPTIONS BY GUENÉE.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

The supposed "types" of Guenée in the British Museum have been examined, with the result that some well-established names of Noctuids have been displaced by an uncertain determination. Guenée's collection, which I saw in Chateaudun during the lifetime of the author, is now with M. Oberthier, and should be looked through. But the only evidence we have which is vital is the original description; where this is inapplicable the name should not be used. Only on this evidence can we assume that any of the British Museum specimens are the real types of either Walker or Guenée, because the collections have not been kept intact as Walker left them, and because no type labels were attached by the latter to the specimens. In these pages I have, I hope successfully, rehabilitated *Mamestra lubens*, and, by publishing the following translations, perhaps other undoubted names may be restored to their rights. I maintain, for instance, that whatever may be written on the subject, a name like *Apatela subochrea* should always be retained for the species, in reference to the contradictory opinions which have appeared in print. What we want is certainty in designating the object, and, when circumstances clearly admit of doubt and authors disagree, the *sure* title should be preferred in every case. There is now far more confusion as to specific titles of our Noctuids than formerly, when the current determinations were mainly supplied by me.

1. *Leucania insueta*, Guenée, I., 81.

"32. mm. This has much resemblance to *obsoleta*. Fore wings appearing a little less pointed at apices. They are darker; there is a small basal black line beneath median vein. The dots forming the t. p. line are more confused, more oblong, and the line is strongly deflexed at costa. The white cellular dot is hardly legible; finally the ends of the nervules are white to the fringe, where the streaks broaden a little. Hind wings blackish-gray, nowhere white. All the wings darker beneath. New York; coll. Doubleday. A single poor male."

This description does not fit *adonea* at all, which I believe to be distinct from any species described by either Guenée or Walker.

2. I append here Guenée's description of what is now commonly called *Agrotis ochrogaster* in the Canadian Reports. Since *A. turris*, Grote, and its red form, *A. gularis*, are common, this description might be

compared, and if it can be made to apply to any one example, then *ochrogaster* may be confined to the species; if not, then it seems to me not. As to *illata*, Walker, Canadian specimens seen by me so labelled were *suffusca*, to which Walker's description might well apply. It would require evidence to make me believe that Walker's supposed type in B. M. is authentic.

"A little larger than *plecta*, which it resembles in markings." (It seems to me this cannot well be said of *turris*.) "The red of primaries is paler" (this is, then, a reddish form, like *gularis*), "and the sub-terminal line is well marked by a dark blackish shade. The terminal dots are rounded and separate; the fringe is divided by a dark line; the spots are much larger; the reniform less constricted, and the median vein evenly white." (This latter does not seem to agree with *gularis*.) "Hind wings with a very distinct terminal series of rounded dots. Collar ochrey white, as also the abdomen, which is unicolorous and without the terminal reddish tuft (*i. e.*, of *plecta*). Am. Sept.; coll. Bdv.; one male."

The comparison by Guenée with *plecta* led me to seek for a form more resembling *plecta* than either *turris* or *gularis*. This is a matter to be left to some unprejudiced observer, who will compare sufficient material with above description. *Agrotis turris* seemed to me allied to the Californian, *A. Wilsoni*.

3. *Catocala micronympha*, Guenée, III., 102.

"Shape and form of *protonympha*, which it is very near, and from which it is only distinguished by slight, though constant, characters. Such are the more pointed apices, more brownish shade of colour, the shape of t. p. line, the band of hind wings more angulate, the [markings of the] base of primaries beneath, the thinner palpi, etc. Fore wings slightly dentate, costa arching outwardly, apex quite sharp; of a chestnut brown, varied with whitish-gray and blackish. The two median lines distinct, but narrow, separated above and approaching below; the t. p. line forming, at end of cell, a strong bend, with two teeth, of which the inferior is almost obsolete, after which the line is nearly regularly waved, without any inward bending below submedian vein, which latter is shaded with black throughout its length. Reniform replaced by a simple black mark. Median shade well marked, but interrupted on cell, and turning thence towards terminal margin, where it stains with blackish

two or three of the veins. Subterminal whitish, waved zigzag, nearly perpendicular, touching in passing the principal tooth of t. p. line. Hind wings dark yellow, with broad arcuated border, interrupted at usual place to form an anal spot; a narrow median band a little angulated, and two rays of blackish hair joining it. Beneath the band is broader, especially at costa, near which it nearly attains, or is joined, to the base. Fore wings beneath entirely yellow to the first black band. Am. Sept.; one male."

We could not fit this with *fratercula*, G. & R., on account of the chestnut brown primaries, and some other points. Where Guenée compares with a European species this latter should be procured and used to check the identification.

4. *Catocala Belfragiana*, Harvey.

This name has been supplanted by *messalina*, whereas the description of the latter presents an important difference of the band on secondaries. Possibly Guenée's species is something quite different, and I protest against the use of *messalina* for this species until Guenée's type is compared, or a variety of *Belfragiana* is turned up which is covered by Guenée's description of *messalina*.

THE COCCIDÆ OF BRITISH NORTH AMERICA.

BY GEO. B. KING, LAWRENCE, MASS.

The following list of the Coccidæ found to inhabit Canada is complete, so far as the published records show, together with some other information derived from corresponding with Prof. Cockerell, Dr. Fletcher, and Mr. John Dearness. Much, however, has been obtained from material sent to me for identification. In reviewing the list it will be seen that Ontario has 25 species of Coccids credited to her; while Ottawa has 18; Toronto, 6; Quebec, 3; Prince Edward Island, 3; Nova Scotia, 4; New Brunswick, 2; and British Columbia, 6. One has been found in an ants' nest, 8 in greenhouses, and there have been 8 new species described from Canada. There are 46 species, 27 of which are native to North America, 14 are introduced, and 4 whose home is unknown, but which were probably introduced. The large majority of the species have been found by Dr. Fletcher, or at least have passed through his hands. Much credit, however, is due Mr. John Dearness, who has taken great interest in looking for these very injurious insects,

and has sent me several very interesting species. The following also deserve mention, who have found one species each: Messrs. John Morley, R. J. Crew, A. H. McKay, and Rev. G. W. Taylor. Of the 46 species cited, I have had the pleasure of studying 36. The bibliography given refers only to such works as make mention of British North American species.

COCCINÆ.

Eriococcus, Targ.-Tozz.

Eriococcus borealis, Ckll., 1899. (Native.) Found on willow (*Salix*) at Dawson City, 64° N. Lat., by Mr. John Morley.

Bibl.—CANADIAN ENTOMOLOGIST, Vol. xxxi. (1899), 370. Originally described from Dawson City, British North America.

Phenacoccus, Ckll.

Phenacoccus Dearnessi, n. sp. (Native.) Sac white, the sac wholly covering the body. ♀ dark red-brown. Boiled in caustic potash the derm is colourless. Legs and mouth-parts ochreous. Antennæ pale yellow, 9-jointed: 3 longest, although 2 + 3 are sometimes equal, 9 next and a little longer than 1, 5 + 8 next and equal, 6 + 7 are shortest and equal. The joints are quite variable in length, as will be seen from the following measurements:

Joint	1	2	3	4	5	6	7	8	9	
	40	56	60	28	44	36	36	32	60.	Formula (39)215(67)84.
	40	60	60	32	26	28	28	32	52.	" (23)915(48)(67).
	40	52	52	40	40	28	28	32	52.	" (239)(145)8(67).
	44	56	52	24	36	32	56	60		an 8-jointed form, hardly adult.

Legs short, stout.

Middle leg: coxa, 80; fem. with troch., 180; tibia, 116; tarsus, 72; claw, 24.

Hind leg: " 88; " " 200; " 148; " 84; " 24.

Scattered over the body are several long thin hairs and short thick spines. The gland-pits are not numerous, and are very small. Caudal tubercles large, round, with two long setæ, and several long thin hairs; the tubercles are well covered with short, stout, spear-shaped spines. Young larva: Antennæ 6-jointed, measuring as follows: Joint—(1)24. (2)32. (3)40. (4)24. (5)24. (6)68.

Hab.—On an old hawthorn tree near London, Ontario, June, 1900. Collected by Mr. John Dearness, to whom the insect is dedicated. This species is allied to *P. gossypii* and *P. helianthi*, but differs from both in the legs being much shorter, and in the colour of the legs and antennæ.

(TO BE CONTINUED.)

NEW GENUS INCLUDING TWO NEW SPECIES OF SALDIDÆ.

BY HERBERT OSBORN, OHIO STATE UNIVERSITY, COLUMBUS, OHIO.

SALDOIDA, nov. gen.

Head narrower, eyes nearer together than in *Salda*, ocelli approximate, frontal ridge weak, becoming obsolete at base of tylus, bucculæ enlarged; antennæ with the two distal joints incrassate, rostrum as in *Salda*, basal joints very thick, second elongate, terminal very slender. Prothorax bearing two very prominent conical tubercles on anterior lobe, which is narrow, cylindrical, not carinate anteriorly; posterior lobe short, carinate laterally, widening rapidly to humeri.

SALDOIDA SLOSSONI, n. sp.

Hind angle of pronotum obtuse, not produced into a sharp angle or horn. Light brown, marked with reddish-yellow and black, face testaceous. ♀—Length to tip of elytra, 3 mm.; width at humeri, scarcely 1 mm.

Head obtusely triangular, subcordate, inclined, the part in front of the eyes nearly equal to eyes in length, very sparsely set with erect hairs; eyes large; vertex narrow, less than width of eye; ocelli minute, set close together; antennæ long, joint two longer than one, equal to three, three much swollen, four equalling one in length, and about half as thick as three; rostrum reaching to apex of hind coxæ. Prothorax with two very large, erect, conical tubercles occupying the upper surface of the anterior lobe; posterior lobe short, much widened behind, concavely emarginate, the lateral angles obtusely angulate. Scutellum large, anterior border convex, surface polished, minutely punctate, apex inflated, highly polished. Elytral membrane subhyaline, with four cells and a wide margin, wings reaching to tip of elytra, milky hyaline.

Colour: Vertex black, with margins next eyes red-brown; face and rostrum testaceous; antennæ, basal two-thirds of second joint and all of third fuscous, apex of one and two whitish, fourth yellowish brown, darker at base and minute tip; prothoracic tubercles red-brown, posterior lobe yellowish brown, anterior margin and band back of the tubercles black; scutellum black, apex piceous brown; elytra brown, claval suture and apical margin of corium black, corium with two triangular whitish spots, the bases of which merge into the hyaline costa, membrane with fuscous base and hyaline apex; beneath black, with throat, pleural pieces, coxæ and legs yellowish brown, darker on disc of coxæ, apical portion of femora

and base of tibiæ, the apex of tibiæ and last joint of tarsus, fuscous; margin of last ventral segment whitish.

Described from one specimen (♀) from Florida, collected by Mrs. Annie Trumbull Slosson, to whom it is most respectfully dedicated. This and the following, which are certainly most exquisite little creatures, have been in my hands for some years, but publication of the descriptions has been deferred in hopes that additional material, representing both sexes, might make more perfect descriptions possible. It seems desirable, however, that they should not be omitted in a systematic work on the family such as is now being prepared by Prof. Summers, and hence their publication at this time.

SALDOIDA CORNUTA, n. sp.

Hind angles of pronotum produced into conspicuous horns. Black, marked with brown. ♀—Length, 2.5 mm.; width at humeri, .75 mm.

Vertex and front minutely gibbous, sparsely set with short appressed hairs; ocelli minute, approximate; antennæ with joints one, two and four nearly equal in length, joint three about one-half longer, and much swollen, fourth less swollen; rostrum about reaching hind coxæ. Conical tubercles of the pronotum very slightly divergent, otherwise almost precisely like those of *Slossoni* in shape; the posterior lobe of pronotum very short, posterior angles produced into prominent upturned horns, with a blunt polished tip. Scutellum minutely roughened, becoming smooth at apex, not inflated. Elytra subhyaline on costa, the membrane rather coriaceous, with veins obsolete, apparently with three cells and rather narrow margin. Wings aborted, unless accidentally broken off in this specimen.

Colour: Vertex, front, third joint of antennæ, prothorax except posterior horns, scutellum, claval sutures and apex of corium, pectus and base of last ventral segment, black; clypeus, rostrum, joints one, two and four of antennæ, posterior horns of pronotum, coxæ and apices of femora, reddish brown; a brown patch on disc of clavus and base of corium, a whitish oblique spot on corium merging into the hyaline costa. Membrane deeply infuscated; the first and fourth joints of antennæ are widely whitish, as also the hind coxæ, base of femora and the apical two-thirds of last ventral segment, the central part of which is transparent, showing ovipositor clearly.

Described from one specimen (♀) collected by Mrs. Slosson in Florida.

AN EXPERIMENT IN THE IMPORTATION OF BENEFICIAL INSECTS.

BY F. M. WEBSTER, WOOSTER, OHIO.

In the February number of the CANADIAN ENTOMOLOGIST I gave the results of an experiment in the exportation of a few of our native lady beetles to South Africa. I now have the pleasure of giving the result of an experiment in the importation of some South African lady beetles.

March 27th, Mr. C. W. Mally, Assistant Government Entomologist, sent me several specimens of *Exochomus nigromaculatus*, and quite a large number of two smaller, unnamed species. All of these attack more especially the Mealy bug, *Dactylopius*, in their native home. The consignment was made by simply fastening twigs of Oleander very badly affected with Mealy bug, to the bottom of the box, and putting the lady beetles among them. The package reached me April 23rd, and, strangely enough, there were but very few of the specimens that were not alive and active. The importation was thus an entire success. Mr. Mally writes me that, about Cape Town, these lady beetles are kept considerably reduced in numbers by a small Hymenopterous parasite. In releasing the lady beetles, we took precautions not to allow these parasites to escape, so that the insect, if it secures a foothold in this country and stands the climate, will have no natural enemies to hold it in check. In cases like this, and more especially in the one previously recorded, any permanent establishment of these insects would be to a certain extent accidental; that is, in the former case the lady beetles were not sent out to prey upon an insect in South Africa, whose original home was in America. In the present instance these lady beetles will probably destroy the Mealy bugs in conservatories, but it is yet to be determined whether they can withstand the rigours of our northern climate in the open. Very many injurious species are introduced and become established in this country through pure accident, and it would seem that we might expect an occasional instance of this kind to occur among beneficial insects intentionally introduced; but the principal motive in these two transactions has been, not so much with a view of colonizing these insects in the respective countries, as to secure information that would be of service to us in future transactions of this kind.

These experiments cost practically nothing, and through them we shall be able to get a better idea of the best methods of sending beneficial insects from one country to another, so that when an opportunity does

occur, where we may feel reasonably sure of success, we shall be in better shape to send insects of this character in a manner most likely to enable them to reach their destination with the least number of fatalities while in transit. It is by this continually doing something that we are some day enabled to accomplish much.

THE LINNÆAN GENUS GRYLLUS—ADDITIONS AND CORRECTIONS.

Quite recently I was kindly informed by Mr. S. H. Scudder, that in my paper on the divisions and species of the original genus *Gryllus* (CANAD. ENT., XXXIII., pp. 118-121), I had overlooked the fact that Fieber's paper had appeared in *Lotos* in 1853. With the information furnished by Mr. Scudder, I examined the work, and found that *Mecostethus* appeared in the May number, on page 99, and *Pachytylus* and *Psophus* in the June number, on pages 121 and 122, respectively. This fact further clinches the Linnæan *Locusta* on Fischer's *Stenobothrus*.

The date given for Thunberg's *Gomphocerus* is erroneous, and should be 1815, while the original spelling of Bolivar's "*Humbella*" is *Humbe*.

JAMES A. G. REHN, Philadelphia.

ERRATUM.—Page 129, line 15, for "*Ziphidium*" read *Xiphidium*.

Mailed June 3rd, 1901.