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The Canadian Entomologist.

VOL. XXII.

LONDON, JULY, 1890.

No. 7.

APHIDIUS GRANARIAPHIS, N. SP.

BY PROF. A. J. COOK, AGRICULTURAL COLLEGE, MICHIGAN.

Black above, yellowish brown beneath. The antennæ are black, the front, mouth parts and legs yellowish brown. Rarely the femora and tarsi are dusky, and the ventral surface quite dark. Very rarely the dorsal surface is brownish, except the pedicel and tip. The occiput or collar is brown. The antennæ are sixteen-jointed in the female, and seventeen in the male, and are cylindrical, recurved, and thickly set with short, light colored hairs. The first two joints are shorter and larger than the others; the succeeding joints are cylindrical, close together, and equal in length, except the last, which is longer and conical. The abdomen is lanceolate, and all the segments are freely moveable on each other, so it can be easily bent under the thorax. The venation of the wings—see figure—is simple, and the first discoidal cell incomplete. We know from the simple venation of the wings that this is a Braconid. It belongs to the genus *Aphidius*, as the first discoidal cell is incomplete, the abdomen lanceolate, the antennæ sixteen or seventeen-jointed, and the ventral valves in the female simple. It is $2\frac{1}{2}$ mm. (1-10 in.) long.

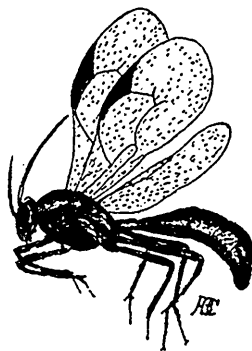


Fig. 3.

This species differs from *Aphidius avenaphis* Fitch, as that species has nineteen or twenty joints to the antennæ, is honey yellow where this is brown, and the first two joints of the antennæ, the pedicel of the abdomen, and a spot on the suture between the first and second joints of the abdomen are honey yellow and not black as in *Granariaphis*. The joints of the antennæ are also less pedicelated, or closer together than in the *Avenaphis*.

This species is interesting from the fact that it was the principal agent in exterminating the countless millions of grain Aphides last season—1889—in Michigan and adjacent States. While *Aphidius avenaphis* and other enemies, like *Syrphus* flies, *Coccinelids* and *Chrysopa* fly larvæ were

numerous and very active. Yet, by far the greater part of the louse destruction here was accomplished by this new species—*Aphidius gran-*



Fig. 4.

ariaphis. June 30th.—The heads of wheat were thronged with healthy vigorous lice, with but few of the light colored rounded parasitized lice—see figures. Ten days later the lice were nearly gone, and the parasitized ones were largely in the majority. Rapidly as the lice increase, they seem to be

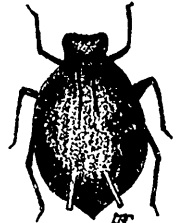


Fig. 5.

no match in this respect for the parasites.

I think the grain lice *Aphis* (*Siphonaphora*) *avenæ* destroyed at least one-third of the wheat crop of Michigan last year, and greatly injured the balance of the crop. Had it not been for these parasites we should have had, I think, no crop at all.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF CERTAIN SPECIES INHABITING THE ROCKY MOUNTAINS IN LATITUDE $51^{\circ} 25'$.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

(Continued from page 99.)

DEFINITE MARKS OF THE ♀.—Observation of 62 caught specimens enables me to supplement, in some degree, Mr. Strecker's description. The smallest measures 46 mm., equal to 1.8 inch. The largest is 58.5 mm., or 2.3 inches. The average expanse of the 62 is 52.5 mm., or 2.07 inches. The cell spot above primary is larger than in the males, and has never that semi-obsolete appearance which it presents in some of the males; it varies from a small but definite spot of .5 mm. in diameter to a spot of 1.5 mm., is usually sub-rotund, sometimes sub-linear, and is frequently centered with yellow in moderate degree. On under side hind wing the dark nucleus or "patch" of costa is lacking in all, and the sub-marginal series of dark spots beneath both wings is found to be plainly presented only in three specimens, with slight traces in fifteen others. *Elis* ♀ varies greatly as to condition of border above primary; a few of my specimens have a completed dark border, much as in an average *Hecla*, with the yellow spots small and entirely enclosed. These, however, are extreme instances. At the opposite extreme are specimens

with only the outer side of the border formed, the inner side lacking, but with the row of yellow spots tolerably conspicuous in contrast to the orange ground of the disk. Between these two extremes occur numerous intermediate degrees. The most qualitative distinction of the fore-wing border is that the yellow spots are in general nearly of equal size in the same individual, and especially that the spot at anterior median interspace is usually almost as large as the others; this is the spot which in most forms of *Colias* is usually much smaller than the adjoining spots, and which tends to become obsolete in proportion as the border is more completely developed.

The special type of ♀ Mr. Strecker drew his description from, with seven yellow spots in fore-wing border, is not the more common variation. Usually the two spots near apex are obsolete; an occasional specimen, however, with all the seven spots neatly defined, attests the accuracy of the printed description.

Mr. Strecker also describes an "Albinous ♀ form" of *Elis*, stating that about six of the albinous and nine of the orange form were taken by Capt. Geddes. This proportion of six albino to nine orange, indicates that the "albinous ♀" was based on an error of identification. In the course of several summers' collecting, and also in breeding *Elis* pretty freely from the egg, nothing resembling an albino has been found, while I have seen *ninety* orange ♀s. The ♀ of another species must have been mistaken by Mr. Strecker for a white form of *Elis*. In the district occupied by *Elis* occurs a *colias* rather less frequent, the ♀ usually nearly white, but with a variety still more rare which is a bright clear yellow. It seems likely this white *Colias*, about size of a small *Elis*, may have been the original of the supposed "white *Elis*." The status of this form is somewhat in doubt. It is near to *Pelidne* and *Scudderi*, as its ♂ sufficiently demonstrates, and of course not specially close to *Elis*; its ♀, however, has some resemblance to *Elis* ♀.

One important character of *Elis* remains to be mentioned, which is, that the ♂ is characterized by the presence of the so-called "glandular space" on upper surface of hind wing on costa near base of wing. This structure appears, under moderate enlargement, as a dense cluster of much tilted scales of special form. Its function (if it has one) is probably mechanical rather than physiological. So far as the *Colias* forms are concerned, it is found especially, if not exclusively, in the higher forms, and

wanting in the more primitive, being apparently a modern improvement adapted to some purpose of mechanical utility and developed only at an advanced stage of *Coliad* progress. Perchance 'tis a refinement in the mechanism of flight, or mayhap some new sort of musical implement, dispensing ultimate atoms of harmony inaccessible to our coarse sense as the "music of the spheres." Of the North American forms of *Colias* only three beside *Elis* are possessed of this peculiar apparatus. These are *Meadii*, *Casonia* and *Eurydice*, and the possession of this character brings them into very good society indeed, comprising such fine species as *Lesbia*, *Aurora*, *Vautieri*, *Fieldii* and *Electra*, in all of which I have examined this structure, as also in *Edusa* and *Myrmidone*. In *Elis* it appears in all the males I have obtained, whether bred or caught. This "glandular space" is not peculiar to *Colias*. I have noticed it in several species of *Catopsilia*, among them *Rurina*, *Trite* and *Pyranthe*. In *Gonopteryx clorinde* ♂ the structure is well developed, being in the specimen I examined 17 mm. long, and 2 mm. broad in the middle; the colour pale brown. In *Colias elis* the "glandular space" varies from a pale—slightly greenish—yellow to a bright orange.

The foregoing parts of this description, relating to the size and proportions of the butterfly, the breadth of the dark borders, and the size of the several spots and marks on the wings, have been taken from captured butterflies, because bred specimens seldom present the natural averages, but instead exhibit differentiations constituting either type retardation or race progress resulting from and proportioned to the conditions under which they are reared; conditions usually diverse from those of nature. It will not be necessary to adhere to this discrimination in describing the colors and the minute details, and these can more profitably be derived from observation of the bred specimens, where they are displayed in a perfection almost impossible to find intact in flown specimens.

The material of *Elis* bred during three seasons, 1887 to 1889 inclusive, consists of three families *ex ovo*, and four butterflies matured from larvæ found wild—altogether 37 ♂ and 28 ♀, not to mention a lot of parasites from one of the estray larvæ. These bred specimens mostly show a departure from the average type developed under ordinary out-of-doors conditions. In general this diversion is a progress, an advance of type, a presentation of the ideal instead of the practical *Elis*. In natural conditions *Elis* is subject to somewhat severe limitations. The caterpillar

issues from the egg early in August in average seasons, and its term of hibernation, beginning soon after the middle of August, continues until approximately the beginning of May, so that ordinarily hibernation lasts somewhat more than eight months. Emerging from its winter shelter early in May, the juvenile larva re-enters active life, still a literal infant though over eight months old*.

So chilly are the May nights, and many of its days also, that more than half this active period of the larva must be passed in a state scarcely different from actual hibernation. The conditions of life are doubtless somewhat restrictive, and a removal of these disabilities, by rearing the caterpillars in a warm house, is like an introduction into the tropics.

The result of this culture in an improved climate, other circumstances being favorable, is a notable progress of type, an outcome of butterflies definitely in advance of the ordinary averages.

One of the bred families illustrates well this immediate improvement of type. This lot comprises nine ♂s and ten ♀s, and is a natural family from eggs of one ♀. The increased size of these specimens, as compared with the caught lot, is decisive. The twenty-nine caught ♂s average 51 1-5 mm.; the nine ♂s of this family show an average expanse of 53 $\frac{2}{3}$ mm. Only one of the ♂s of this family expands less than the average of the caught ♂s, each of the remaining eight exceeding that average. The ten ♀s average 57 $\frac{1}{2}$ mm., against 52 $\frac{1}{2}$ mm., as the average measure of the 62 caught ♀s; indeed, each of the ten ♀s of this brood is decidedly beyond the average of the caught ♀s, none being under 55 $\frac{1}{2}$ mm. One of the ♀s, measuring sixty mm., is slightly over 2.36 inches, is the largest *Elis* in my series. These nineteen specimens are as much superior to the caught material, in average of pattern elaboration, as in size. At a first general view they might almost suggest the idea of a distinct species, so superior are they as a body to the general mass of the caught set. But the difference would become intelligible to any careful observer, on inspection, as a simple advance of one set beyond the average development of the other; a difference in degree, not a change in method. This distinction between quantitative and qualitative differences is the vital point in

* I hope none of my younger readers entertain the absurd mediæval superstition that hibernating caterpillars pass the winter in a *frozen condition*. In successful hibernation they do not get near to such a condition; but if they do absolutely freeze, then are they undone caterpillars. Valkyria gives them sleep, unmixed with dreams, and they wake in Valhalla.

estimating the status of closely related forms. With fully representative material of any two forms to compare, the pattern on the wings tells the story, if the observer can read in the butterfly alphabet. The errors of interpretation come chiefly from the primary fault of mistaking a contrast between less and more for a diversity of like from unlike, or the reverse. In frequent comparisons of *Elis* and *Meadii*, my chief effort has been to ascertain the nature of the difference between them, and my resulting impression is that *Elis* is a valid species, near as it is to *Meadii*. I do not find an overlap of closely similar specimens uniting them, and the two forms appear to have a somewhat diverse plan of pattern, a somewhat dissimilar method of variation, indicating that they are travelling different roads. They are, I take it, already a little different in kind, not merely in degree. In comparing the nineteen *Elis* of the family above mentioned, with the set of caught *Elis*, however, the difference is one which need not be misread, even were the circumstances of origin unknown. It is a difference large in amount, but not signifying alienation. The overlap between the two series consists chiefly of a small proportion of males; several of the most finely developed of the caught set being about of the same rank as several of the least developed males in the bred family. Among all the caught females only one compares in size and fine development with the average of the ten females of this family. Evidently, in this signal advance in race character, the females showed more tendency to depart from type than the males. All the females in this family except one, and more than half the males, far surpass the average of caught set as to breadth of dark borders, and it is a genuine progress, entirely free from that erratic over-development of dark markings often occurring in bred specimens; in these specimens the effect is completely harmonious and symmetrical. In this family there are two colors, both of males and females. Four of the males are yellow-orange, the other five bright red-orange, one of them very fiery orange. Eight females are of the red shade, several being almost of as intense a shade as the most brilliant male; the remaining two are yellow, not so clear and light as the yellow-orange males, but slightly tinged with ochre. The reddest males and females are unlike any *Meadii* in my collection; clearer red than any, and lacking the burned-brick tinge of one very red female *Meadii*. Only two, both females, of the caught *Elis*, are quite of this pure red-orange hue. The caught *Elis* do not specially differ from *Meadii* in the color of disk above primary, and are in general somewhat tinged with ochre; one female is

unique in color, being greenish-yellow, but is not otherwise variant from usual form.

Another family consisting of twenty-five ♂s and thirteen ♀s, from eggs laid by one female, scarcely, if at all, surpasses the averages of the caught material as to expanse. The twenty-five ♂s show an average of only $50\frac{1}{2}$ mm., while the caught males average 51.1-5 mm. The thirteen ♀s average slightly larger than the caught females, 53 mm. against $52\frac{1}{2}$ mm. As to pattern, the females present a rather more perfected type than the out-door average, but the males are scarcely equal to the natural average.

The relation found in these two bred families between the numerical proportion of the sexes and the degree of type development, lends some support to the hypothesis that favorable conditions during larval growth tend to a greater production of females, while less favorable conditions produce an increased outcome of males. The proportion of males to females in these two broods is in great contrast. The brood which shows such improved averages contains slightly more than an even share of females; and the family averaging scarcely up to nature's mean level contains a large overplus of males.

Additional to the direct evidence derived from inspection of the butterfly, there are several circumstances which add somewhat to the probability that *Elis* is a good species. Of some little weight, perhaps, is the argument from geographical distribution, that so far as known there is a great gap of country between the district of the form *Elis*, and the territory in which dwells *Meadii* proper. Should later discovery be made of *Elis* considerably further south, or of *Meadii* much more to the north than at present known, the probability of their distinctness would be somewhat lessened. Another and better argument is the inference from relative altitude. *Meadii* is normally an alpine butterfly, *Elis* is sub-alpine. All accounts agree that *Meadii* lives above timber, though like other alpine habitants, it may in peculiar circumstances make excursions to a lower level. Just such an incident may have originated *Elis*. One needs not an india-rubber imagination to suppose that somewhere in its mountain line of territory, under specially favoring conditions, *Meadii* may have established a colony below timber line. That accomplished, and the feeble colony proving able to maintain itself in the changed conditions, all the elements of the case would combine to speedily separate the new from the old, in kind. Perhaps hardly in any other way could

a distinct species be so rapidly evolved. The ties between the old and the new forms would either be immediately and permanently sundered, or at least greatly enfeebled, as the only means by which these ties of consanguinity could be preserved would be in recurrence of such unusual incursions as that by which the colony had at first been established. The direct influence of the new conditions would be especially effective in producing modification, because the change of conditions would be an unusually great one. However, this is but conjecture. As facts, we know that *Meadii* lives above timber, and *Elis*, at a great distance to the north, below timber; and that they differ, although not broadly. They are not known to live next door to each other, anywhere. The geographical relations of *Elis* to *Meadii* may prove more interesting and important than the question as to the exact biological ties. Should the name of *Elis* prove to be "Dennis," it is but one more skeleton to stand upon end with the rest of the weird monuments up on Synonym Mountain; but, in either event, one would like to know just why *Elis* and *Meadii* live at different relative altitudes.

The nature of the difference in the imago between *Elis* and *Meadii* is the chief reason for considering them distinct. At first sight, I did not expect *Elis* would prove distinct from *Meadii*. After obtaining gradually an ample material of *Elis*, and becoming quite familiar with its mode of variation, such differences between *Elis* and *Meadii* became evident, that I was obliged to consider the two forms as probably distinct. By the kindness of Mr. David Bruce, I have lately obtained an additional fine series of *Meadii*, and after repeated comparisons find my previous impression strengthened. I suppose that a new species of butterfly may be considered inaugurated, so soon as a varying form has acquired a visible diversity in the method of its biological progress, as compared with the method of the proximate species; and that our earliest recognition of this acquired diversity will be by observation of a correlant diversity in the method of the color-pattern of a representative series of the new species, as compared with the method of the proximate species. I think *Elis* has reached this point and that it is a valid species.

Meadii, as such, does not occur at Laggan. My set of six male and eleven female *Meadii* compare with the caught *Elis*, in average size, as follows: *Meadii*, males 47 $\frac{3}{4}$ mm., females 48 5-7 mm.; caught *Elis*, males 51 1-5 mm., females 52 $\frac{1}{2}$ mm.; "fair count and no favour."

SOME NEW MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Crocota Rosa, nov. spec.

Expanse .80 of an inch.

Upper surface of fore wings, thorax, collar, upper and front of head and terminal joint of palpi pale yellow-brown or fawn color, the only trace of a discal dot is a little duskiess at the end of the cell. Hind wings red, pale, a little dusky, somewhat rosy tinted. Abdomen concolorous with the hind wings; fringes concolorous with the wings.

Beneath, hind wings concolorous with the upper surface; fore wings more red, uniformly so except that the costa is ochre; legs dusky; abdomen as above, without marks of any kind; under side of palpi yellowish red; eyes black.

One example from Texas and one from Ohio.

This species is close to *Rubicundaria* but lacks the black terminal border to the hind wings and the black marks on the abdomen. Besides this the fore wings are a little narrower.

Hemaris Brucei, nov. spec.

Expanse 1.55 inches.

Top of head, thorax and basal two joints of abdomen, olive, not very dark, the shoulder tufts yellowish, only a little lighter than the adjacent parts; the third joint black, with the lateral hairs bright pale yellow, the lateral tufts of one and two the same color, and a faint line of the same on the posterior margin of these joints for a short distance above the tufts; joints 4, 5 and 6 bright pale yellow, the last one slightly rusty, the lateral tufts the same; the terminal joint with its tufts, both lateral and central, jet black. Palpi beneath very pale yellow, almost white, above blackish, only a few black hairs laterally; eyes with a circle of white hairs; body beneath black but sparsely covered with yellow hairs, except the terminal joint where the hairs are black. Wings as in the *Senta* group, the terminal and costal borders dark brown, narrow, somewhat dentate on the inner edge, the most so near posterior angle; the outer two-thirds of the basal patch dark red, a small red apical patch that does not reach the apex, a few olive hairs at the base. Hind wings with the margins dark brown, the inner one sparsely overlaid with olive, a red anal patch. Under side of fore wings with the borders about the same shade as above, the basal portion overlaid with pale yellow, the same scattered well over the costa,

a mere trace of the red on the basal patch, the apical red patch as above. Hind wings with the basal-internal patch overlaid with pale yellow the same as the fore wings, two red stains, one at the anal angle and the other toward the base, the outer border with a slight red tinge, but no more so than above. Antennæ black.

One male from Colorado, collected by David Bruce, and dedicated to him in the name.

Platycerura Gigantea, nov. spec.

Expanse of wings 2.25 inches.

Head, thorax and abdomen rather dark gray, much darker than its ally *Furcilla*, the head and collar with a mixture of brown scales, the abdomen also mixed with brown, except the lateral semi-tufts and the terminal joint. The fore wings with a basal half line and three transverse lines as in *Furcilla*, the second representing the transverse shade of the Noctuidæ, all black; the t. a. line is not quite so much angled on median vein as on *Furcilla*, the line broader; the shade line or second a little more wavy, curving outward on median vein and outward again on submedian, not touching the t. p. line but more separated from it than in *Furcilla*; reniform a black slightly curved mark, shaded a little outwardly; t. p. line takes the same course as in its ally, but not bent inward quite so much below the cell, bordered externally with a very slight pale shade; s. t. line a very faint pale shade taking the same course as in *Furcilla*, and scarcely noticeable only for the slight internal shading of darker gray, this shading more prominent in its anterior third. The wing is almost a uniform gray, except the black transverse lines. Hind wings sordid white, the veins and the internal margin smoky, the costal margin sprinkled with dark scales. Fringes gray, checkered at the end of the veins, the fore wings only faintly so. Under side pale gray, the transverse lines of the fore wings subobsolete, only distinct as black spots on the costa, but the t. a. line and the shading in connection with the s. t. line crossing the wing; hind wings with two black shades extending backward from the costa and a discal spot, the latter showing faintly above. Body below concolorous with the wings. The palpi are short like those of *Furcilla*, the terminal joint blackish; the antennæ with the shaft gray above, the pectinations and all parts below ochre.

One male from Colorado, received from David Bruce. He writes me that he took a half-dozen examples at light. In size this is more nearly

that of a female that I have from Texas that I have called *Furcilla*, but which may possibly be the female of this species. This example expands a little over two inches, the fore wings are a little lighter than the one from Colorado described above, and the t. p. line and the median shade line are united. The hind wings of the Texas specimens are darker than the Colorado, and the fringe of the hind wings is white.

ON THE LISTS OF COLEOPTERA PUBLISHED BY THE
GEOLOGICAL SURVEY OF CANADA, 1842-1888.

BY W. HAGUE HARRINGTON, OTTAWA.

During nearly fifty years the Geological Survey of Canada has been engaged in exploration, and since Confederation it has had practically an unlimited field for its operations. The investigation of the fauna and flora of the Dominion, and the formation of a museum of natural history, are included in the plan of its present organization, but its equipment has hitherto permitted but a partial accomplishment of these departments of its work. Geological investigations and collections have largely absorbed the members of the staff, and systematic work outside of these has been chiefly in ethnology, botany and ornithology. In the museum, entomology is as yet represented but poorly, the only order in which there is a creditable collection being the Lepidoptera, of which the diurnals are well shown by the collection purchased from Capt. Geddes. Any collections made by the officers of the Survey have been in addition to their daily duties, and have been, in consequence, neither very numerous or extensive.

The lists of Coleoptera, which are thinly scattered through the Reports of Progress, have, however, a considerable value as having been made in many instances in remote districts, and before the influx of settlers; thereby giving mostly species indigenous to the various localities, and offering good records for the study of distribution. The fact, also, that all but three short recent lists were furnished by LeConte, renders the determinations of additional value and interest.

As the publications of the Survey are inaccessible to very many entomologists, and as their cost, even when obtainable, prevents their purchase merely for the few entomological lists they contain, it is thought that a reproduction in the CANADIAN ENTOMOLOGIST will be appreciated by its readers.

The lists of LeConte's determinations have been collated so as to present a complete catalogue of the species and show the localities where each occurred. The omission of the names of describers (except in lists A. O., L'O., St. L. and N. C.), and occasional clerical or typographical errors have made the identification of some species difficult, and in a few instances so doubtful that they have been allowed to remain as in the original, and will appear in italics in the catalogue. The list of the British Columbia species was especially puzzling in this respect.

The catalogue, collated from the twenty lists which follow, contains 900 references to 469 species (including about a dozen varieties or races), which belong to 216 genera of 40 families. Of these references 300, or exactly one-third, are to 137 species of *Cicindelidæ* and *Carabidæ*, while many of the other species in the catalogue are such as one might expect to be found by collectors whose attention would be largely directed to the ground. The following are the lists which have been collated:—

Report of Progress, 1858, pp. 233-237 and 247-249.

A.O.—Catalogue of Coleoptera, collected by Mr. D'Urban, in the Counties of Argenteuil and Ottawa, in 1858, (99 species named, and following not determined *Gyrinus*, *Dineutes*, *Homalota*, *Tachyporus*, *Philonthus*, *Stenus*, *Epuræa*, *Cis*, *Cistela*, *Nyctobates*, *Apion*, *Tomicus*).

L'O.—List of Coleoptera from L'Original and Grenville, collected by Mr. R. Bell, (34 species).

St. L.—List of Coleoptera, collected by Mr. R. Bell, on the south-east side of the St. Lawrence, from Quebec to Gaspé, and in the Counties of Rimouski, Gaspé and Bonaventure, (69 species, besides *Brachinus*, *Aphodius*, *Tomicus* and *Galeruca*).

Report of Progress, 1875-76, pp. 107-109.

B.C.—List of Coleoptera, collected during the expedition of Mr. Selwyn to British Columbia in 1875, (146 species, besides *Elaphrus*, "probably n. sp., unless described from *Siberia*," *Hydnobius*, *Boletobius*, *Philonthus*, *Melœ*, *Sitones* and undetermined genera). Collection placed in museum of the Natural History Society of Montreal.

Report of Progress, 1878-79, pp. 65, 66c.

N. C.—List of Coleoptera collected by Dr. R. Bell, in 1879, on the Nelson and Churchill Rivers, (37 species and *Gyrinus*).

Report of Progress, 1879-80, pp. 70, 74c.

List of Coleoptera collected in 1880 in Manitoba, and between Lake Winnipeg and Hudson's Bay, (by Dr. R. Bell, in four localities).

Y. F.—York Factory, Hudson's Bay, August and September, (24 species, also *Amara*, *Hydroporus*, "near *Schönherr* of Europe," and *Graphoderes* "to be described by Dr. Sharp").

N. O.—Norway House to Oxford House, July, (39 species, *Anisotoma* and *Graptodera*).

W.—Lower Fort Garry, Manitoba, June and July, (38 species).

C. L.—Cross Lake, Nelson River, July, (35 species and *Amara*).

Report of Progress, 1880-81-82, pp. 29, 39c.

List of Coleoptera collected in 1881 by Dr. Bell and others in the Lake Superior district, and in the Northwest Territories, east of 112th meridian and south of the 60th parallel.

The species given in Lists I. to VII. were collected by Dr. Bell; those in VIII. by Mr. William Isbister, and those in IX.-XI. by Mr. A. S. Cochrane.

S. M.—I. Sault Ste. Marie, between Lakes Huron and Superior, Lat. 46° 31', Long. 84° 20', (96 species).

M.—II. Mouth of Michipicoten River, Lake Superior, Lat. 47° 56', Long. 84° 51', (9 species).

H. M.—III. Head Waters of the Michipicoten River, Lake Superior, Lat. 48° 30', Long. 84° 00', to Lat. 48° 30', Long. 84° 10', (28 species).

M. F.—IV. From Missinaibi House, north-east of Lake Superior to Flying Post, Lat. 48° 29', Long. 83° 35', to Lat. 48° 02', Long. 82° 20', (18 species and two *Graptodera*).

O. K.—V. Oba and Kabinakagami Lakes and Rivers, north-east of Lake Superior, Lat. 48° 30', Long. 84° 27', to Lat. 49° 45', Long. 83° 45', (43 species).

- T. L.—VI. From Thunder Bay to Lake-of-the-Woods, west of Lake Superior, Lat. $48^{\circ} 25'$, Long. $89^{\circ} 10'$, to Lat. $49^{\circ} 25'$, Long. $95^{\circ} 00'$, (23 species).
- O.—VII. Oxford House, between Lake Winnipeg and Hudson's Bay, Lat. $54^{\circ} 53'$, Long. $95^{\circ} 44'$, (67 species and *Cryptophagus* and *Graptodera*).
- N.—VIII. Nelson River House, near Churchill River, Lat. $55^{\circ} 50'$, Long. $99^{\circ} 30'$, (51 species).
- C. C.—IX. From Cross Lake, on the Nelson River, to Cumberland House, on the Saskatchewan, Lat. $54^{\circ} 40'$, Long. $98^{\circ} 00'$, to Lat. $54^{\circ} 00'$, Long. $102^{\circ} 22'$, (19 species).
- C. R.—X. From Cumberland House to Reindeer Lake, Lat. $54^{\circ} 00'$, Long. $102^{\circ} 22'$, to Lat. $58^{\circ} 30'$, Long. $101^{\circ} 00'$, (19 species).
- R. A.—XI. From the north end of Reindeer Lake to the west end of Athabasca Lake, Lat. $58^{\circ} 30'$, Long. $101^{\circ} 00'$, to Lat. $58^{\circ} 30'$, Long. $101^{\circ} 00'$, (Long. $111^{\circ} 00'$? 3 species).

Catalogue of the Coleoptera determined for the Geological Survey of Canada by Dr. J. L. LeConte :—

CICINDELIDÆ.

- Cicindela longilabris* Say. A.O., St. L., B.C., S.M., M.
purpurea Oliv. S.M., T.L.
var. 10-notata Say. B.C.
vulgaris Say. A.O., St. L., S.M., H.M.
repanda Dej. [*baltimorensis* Hbst.]. A.O., St. L.
var. 12-guttata Dej. St. L., B.C., S.M., H.M.

CARABIDÆ.

- Trachypachys inermis* Mots. B.C.
Cychrus nitidicollis Chev., *var. Brevoorti* Lec. A.O., St. L.
Carabus Mæander Fisch., [*palustris* Fisch.]. [*Lapilayi* Lec.]. St. L.,
 N.O., C.L., O., N., C.C.
Chamissonis Fisch. Y.F., O., N.
tædatus Fab. B.C., N.C., Y.F., O., N.
race Agassii Lec. W., C.R., R.A.
serratus Say. St. L., B.C., C.L.

- Calosoma calidum* *Fab.* St.-L., M.
tepidum *Lec.* B.C.
Elaphrus Clairvillei *Kirby.* B.C.
riparius *Linn.* St. L., O.
race californicus *Mann.* B.C.
Opisthius Richardsoni *Kirby.* B.C.
Notiophilus sibiricus *Mots.* [punctatus *Lec.*]. A.O., C.C.
Hardyi *Putz.* N.O., C.L., O.
Nebria Sahlbergi *Fisch.* B.C., N.C., N.
Mannerheimii *Fisch.* B.C.
Pelophila rudis *Lec.* O.K., N.
Ulkei *Horn.* N.
Nomius pygmæus *Dej.* H.M., O.K.
Bembidium punctatostriatum *Say.* A.O.
carinula *Chd.* [impressum *Fab.*]. A.O., O.K., O.
littorale *Oliv.* [paludosum *Sturm.*]. B.C.
erasum *Lec.* [Mannerheimii *Lec.*]. B.C.
dilatatum *Lec.* St. L.
concolor *Kirby* [salebratum *Lec.*]. W.
quadrulum *Lec.* B.C.
planatum *Lec.* B.C.
complanulum *Mann.* B.C.
funereum *Lec.* B.C.
bimaculatum *Kirby.* N.O., C.L., O.
lucidum *Lec.* A.O., St. L., B.C., Y.F.
picipes *Kirby.* T.L.
Grapei *Gyll.* [nitens *Lec.*]. C.L., O.
incrematum *Lec.* B.C.
patruæ *Dej.* A.O., B.C.
nigripes *Kirby.* B.C., O.
versicolor *Lec.* B.C.
sulcatum *Lec.* B.C.
connivens *Lec.* B.C.
mutatum *G. & H.* [axillare *Lec.*]. B.C., O.
quadrifasciatum *Linn.* C.C.

- Patrobus longicornis* Say. A.O., St. L., S.M.
septentrionis Dej. [hyberboreus Dej.]. O.K.
rugicollis Rand. St. L.
aterrimus Dej. B.C.
- Pterostichus honestus* Say [fastidatus Dej.]. A.O.
coracinus Newm. [adjunctus Lec.]. L'O., St. L., H.M., M.F., O.K.
punctatissimus Rand. Y.F., N.O., O.K., O.
lucublandus Say (Pæcilus). A.O., St. L., W., S.M., T.L.
caudicalis Say. A.O., St. L., W.
corvinus Dej. St. L.
scrutator Lec. (Lophoglossus). A.O.
orinomum Leach. A.O., St. L., B.C., N.C., Y.F., N.O., W., C. L., S.M., H.M., M.F., O.K., O., N., C.C., C.R.
Luczotii Dej. ("var. præc?"). A.O., St. L.
erythropus Dej. L'O., St. L., S.M.
patruelis Dej. A.O., St. L., T.L.
empetricola Dej. N.C.
mandibularis Kirby. St. L., C.L., O.
- Amara avida* Say. W.
similis Kirby [hæmatopus Dej.]. N.C., N.
rufimanus Kirby [reflexus Putz.]. Y.F.? N.O.
cylindrica Lec. N.O., W., C.L., O.
elongata Lec. N.
latior Kirby [libera Lec.]. St. L., T.L.
angustata Say. L'O.
pallipes Kirby. St. L.
impuncticollis Say. L'O., St. L., S.M., O.K., O.
littoralis Mann. C.R.
fallax Lec. St. L., B.C., W., C.L.
protensa Putz. N.O.
erratica Sturm. B.C., H.M., T.L., N.
interstitialis Dej. St. L., C.L., T.L., O., N.
obesa Say. W., S.M.
musculus Say. W., N.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

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

(Continued from page 120, Volume xxii.)

Genus ANTARCTIA Hbn.

1816—Hübner, Verzeichniss, 192.

1864—Pack., Proc. Ent. Soc., Phil., III., 122.

1873—Stretch, Zyg. & Bomb., 191.

The head is small and retracted; tongue obsolete, palpi very small and weak; antennæ moderately long, bipectinated in the male, simple in the female: the pectinations are long and extend to the tip; legs short and weak, all the spurs present, but very short: the two pairs of the posterior tibiæ close together. The tarsal claws are as in *Spilosoma*, and, indeed, there is no structural difference between these two genera. *Antarctia* has shorter, broader wings, somewhat longer vestiture, and is not white!

Primaries with 7 to 10 stalked, the branches arising in pairs; 3 to 5 from the end of the median, and about one-half closer to 5 than to 6. Secondaries 6 and 7 together from the end of the sub-costal; 8 rather closer to base than usual; 4 and 5 together from the end of the median, 3 very close to the end.

A. punctata Pack.1864—Pack., Proc. Ent. Soc., Phil., III., 123, *Antarctia*.1873—Stretch, Zyg. & Bomb., 192. = *vagans*.1875—Edw., Proc. Cal. Ac. Sci., V., 188, *Antarctia*.*rufula* ♀ Bdv.1855—Bdv., Ann. Soc. Ent. Fr., 1855, Bull., p. 32, *Nemceophila*.1868—Grt. & Rob., Cat. Lep. N. A., *Nemceophila*.1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 79 *Arctia*.1870—Grt. & Rob., Tr. Am. Ent. Soc., III., 175, *pr. syn.*1875—Edw., Proc. Cal. Ac. Sci., V., 367, *pr. syn.*1881—Neum., Papilio, I., 80, *pr. syn.*var. *proba* Hy. Edw.1881—Edw., Papilio, I., 39, *Antarctia*.

Habitat—Sierra Nev., California, Oregon.

A. rubra Neum.1881—Neum., Papilio, I., 79, *Antarctia*.1881—Butl., Ann. Mag. N. H., ser. 5, VIII., 311, *Antarctia*.

Habitat—Oregon, California.

A. vagans Bdv.1852—Bdv.*, Lep. Cal. (Ann. Soc. Ent. Fr., 2 ser. X., 322), 50, *Arctia*.1856—Wlk., C. B. Mus., Lep. Het. III., 630, *Phragmatobia*.1860—Clem., Pr. Ac. N. Sci. Phil. XII., 336, *Phragmatobia*.1862—Morris, Synopsis, 346, *Phragmatobia*.1864—Pack., Proc. Ent. Soc. Phil., III., 122, *Phragmatobia*.1868—Grt. & Rob., Cat. Lep. N. Am., *Phragmatobia*.1869—Bdv., Lep. Calif. (Ann. Soc. Ent., Belg., XII.), 79, *Arctia*.1873—Stretch, Zyg. & Bomb., 192, pl. VIII., ff. 8-12, *Antarctia*.
pteridis Hy. Edw.1875—Edw., Proc. Cal. Ac. Sci., V., 264, *Antarctia*.1875—Edw., Proc. Cal. Ac. Sci., V., 367, *pr. syn.*var. *rufula* Bdv.1852—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 80, *Arctia*.1873—Stretch, Zyg. & Bomb., 192, *pr. syn.*1881—Neum., Papilio, I., 79, *pr. var.*

Habitat—California, Vancouver.

Food plant—*Lupin* (Stretch).*A. walsinghami* Butl.1881—Butl., Ann. & Mag. N. H., ser. 5, VIII., 311, *Antarctia*.

Habitat—Oregon.

The synonymy in this genus is far from settled. There are probably fewer species than are given here. At all events, I do not see why *rufula* must not replace *punctata* Pack., for, though the male was a mere variety of *vagans*, the female referred to a good species, and the name cannot be dropped, because in part a synonym. I have not made the change here, but content myself with calling attention to the necessity for it.

GENUS LEUCARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 124.

Head small and retracted; palpi short; tongue short and weak. Antennæ short, pectinated in both sexes, the pectinations in the female

short, but nearly as long as those of the male. Legs short and stout, anterior tibiæ with a short stout spine at either side of tip; middle and posterior tibiæ with minute terminal spurs only. The claws of tarsi are toothed in both sexes.

Primaries with 7 to 10 from a stalk in the order 10, 7, 8, 9; 3 to 5 from end of median, 4 nearer to 5 than to 3.

Secondaries 6 and 7 from same point at end of sub-costal; 8 from sub-costal half way to base; 3 to 5 almost equidistant from end of median.

Moeschler, in 1876, Stett. Ent. Zeit., XXXVII., 297, makes this a synonym of *Spilosoma*.

L. acraea Drury.

- 1770—Drury, Exot., I., pl. III., f. 2 (♀) and 3 (♂), *Phalæna*.
 1793—Fabr., Ent. Syst., III., 1, 451, *Bombyx acraea*.
 1797—Sm. & Abb*, Ins. Ga., II., 133, pl. 67, *Phalæna acraea*.
 1816—Hüb., Veizeichniss, 184, *Estigmene*.
 1820—Hüb., Samml. Auss. Schmett., II., pl. 404, *Estigmene acraea*.
 1823—Harris*, Mass. Agr. Repos. & Journ., VII., 323, *Arctia*.
 1833—Harris, Cat. Ins. Mass., 591, *Arctia*.
 1837—Westw., ed Dru., I., 7, *Spilosoma*.
 1841—Duncan*, Nat. Libr., XXXII., 171, pl. 20, ff. 1-3, *Spilosoma*.
 1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 53, *Spilosoma*.
 1862—Morris*, Synopsis Suppl., 342, *Spilosoma*.
 1862—Harris*, Inj. Ins., Flint, ed. 351, f. 169, pl. VI., ff. 9 (♂) and 10 (♀), *Spilosoma*.
 1864—Pack., Proc. Ent. Soc., Phil., III., 125, *Leucarctia*.
 1869—Bdv., Lep. Calif. (Ann. Soc. Ent., Belg., XII.), 78, *Arctia acraea*.
 1873—Stretch*, Zyg. & Bomb., 99, pl. 4, ff. 1-3, and pl. 10, f. 6, *Leucarctia*.
 1874—Morrison, Psyche, I., 21, *Leucarctia*.
 1875—Edw.*, Proc. Cal. Ac. Sci., V., 368, *Leucarctia*.
 1883—Weed, Papilio, III., 84, *Leucarctia*.
 1883—Grt., Papilio, III., 84, *Leucarctia*.
 1883—Stretch, Papilio, III., 141, *Leucarctia*.
 1884—Bean*, CAN. ENT., XVI., 66, *Spilosoma*.
 1886—Smith, Ent. Amer., II., 79, *Leucarctia*.

pseuderminia Peck.1823—Peck., Mass. Agr. Rep. & Journ., VII., 328, pl. 1, *Arctia*.1837—Westw., ed. Drury, I., 7, *pr. syn.*1855—Wlk., C. B. Mus., Lep. Het., III., 667, *Spilosoma*.*caprotina* Drury.1770—Dru., Exot., I., pl. 3, f. 3, *Phaena*.1782—Cram., Pap. Exot., III., 170, pl. 287, f. C, *Phaena*.1797—Sm. & Abb., Ins. Ga., II., 133, *pr. syn.*1837—Westw., ed. Dru., I., 7, *pr. syn.**californica* Pack.1864—Pack., Proc. Ent. Soc., Phil., III., 125, *Leucarctia*.1872—Pack., 4th Rept. Peab. Ac., 86, *pr. syn.**packardii* Schaupp.1882—Schaupp, in Check List Bkln. Ent. Soc., 8, *Spilosoma*.

Habitat—United States and Canada.

Food plant—Omnivorous.

L. albida Stretch.1873—Stretch, Zyg. & Bomb., 203, pl. 8, f. 22, *Leucarctia*.1875—Butler, Cist. Ent., II., 36, *an sp. dist. virginica?*1876—Stretch, Rept. Geol. Surv., west 100 merid., V., 798, pl. 40,
ff. 4 and 5, *Leucarctia*.

Habitat—California.

The *Arctia scuirus* of Boisduval was referred by Grote and Robinson to *acraea*, but is now recognized as referring to *Euchaetes collaris*! The peculiar male characters of the *acraea* have been described by Mr. Morrison, and later figured by myself.

Leucarctia permaculata Pack. is an *Ecpantheria*, and is referred to under that genus. I do not find the species in Mr. Grote's list, but perhaps it may be referred to in some paper which I have not seen.

(To be continued.)