

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

Coloured covers/
Couverture de couleur

Coloured pages/
Pages de couleur

Covers damaged/
Couverture endommagée

Pages damaged/
Pages endommagées

Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée

Pages restored and/or laminated/
Pages restaurées et/ou pelliculées

Cover title missing/
Le titre de couverture manque

Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées

Coloured maps/
Cartes géographiques en couleur

Pages detached/
Pages détachées

Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)

Showthrough/
Transparence

Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur

Quality of print varies/
Qualité inégale de l'impression

Bound with other material/
Relié avec d'autres documents

Continuous pagination/
Pagination continue

Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure

Includes index(es)/
Comprend un (des) index

Title on header taken from: /
Le titre de l'en-tête provient:

Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming /
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

Title page of issue/
Page de titre de la livraison

Caption of issue/
Titre de départ de la livraison

Masthead/
Générique (périodiques) de la livraison

Additional comments: /
Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below /
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						/					

The Canadian Entomologist.

VOL. XXVI.

LONDON, JUNE, 1894.

No. 6.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

I. THE CICINDELIDÆ OF ONTARIO AND QUEBEC.

[The following is the first of a series of papers which Mr. Wickham is specially preparing for this magazine. It is intended that they should treat of all the more conspicuous families of Coleoptera and present in tabular form the genera and species that are found in the Provinces of Ontario and Quebec; a descriptive list will also be given of the species, so far as known, that are to be found in the other provinces of the Dominion of Canada. The object in view is to assist collectors who have hitherto been unable, from the want of books or other causes, to identify the beetles they have caught, and to encourage them in the study of this most interesting order of insects. As many illustrations as possible will be given, and every effort will be made to render the papers thoroughly helpful to those who make use of them. It is hoped, also, that the aid thus given will lead on many of our younger readers to become students of Entomology, rather than mere collectors. The bibliography at the end of each paper will be of service to those who are not content to remain "beginners."—ED. C. E.]

The beetles of this family are among the first to attract the attention of the collector. Their graceful forms, bright colours, and activity displayed in the pursuit of their prey, on sunny banks or roadsides, render them at once objects of interest and beauty; as much on this account as because of their generally conceded position as the highest of Coleoptera, they are given the first place in this series of articles.

For our purpose the Cicindelidæ may be defined as predaceous ground-beetles, with eleven-jointed filiform antennæ, which are borne on the front above the base of the mandibles. Two genera are represented in the Dominion of Canada, one of which, *Omus*, is confined to the Pacific provinces. It is distinguishable from *Cicindela* by having small eyes and separate posterior coxæ, while in the latter genus the eyes are large and prominent and the posterior coxæ contiguous.



Fig. 11.

The larva of *Cicindela* (fig. 11, *C. vulgaris*) is a somewhat elongate, whitish grub, with a broad, metallic coloured head and prothorax, and a large hump, bearing two hooks, on the fifth abdominal segment. They excavate holes in sunny spots and lie in wait for prey, with the head closing up the mouth of the burrow; when an insect comes within reach it is seized by the long jaws of the larva and the juices extracted. I am now rearing larvæ of *C. limbalis*, Klug, which I dug from holes in a clay bank on the fifteenth of April. They are easily kept in little tin boxes with damp earth, and feed readily on soft-bodied larvæ of wood-borers. The pupa is figured by Letzner* and is represented as bearing on the fifth abdominal dorsal, two long spines corresponding to the hooks on the same segment in the larva.

The perfect insects are to be found in all parts of North America south of the sixtieth parallel, or at least extend very nearly that far north, though more numerous in warm climates. The colours are usually metallic, the elytra more or less spotted and banded with white. When these markings are of the style shown in the figure of *C. hirticollis* (fig. 16) they are said to be *complete*; if, as is sometimes the case, they are reduced to partial obliteration or breaking up of these bands, they are called *incomplete*. The curved mark on the shoulder is known as the humeral lunule, the one at the tip the apical lunule, while the long bent mark extending nearly across the middle is called the median band. An important character, which is to be used in assigning species to their proper places in the table, is to be found in the labrum or upper lip; in most of our species it is short, but in *C. longilabris* it is very long. The free edge is variously toothed in the Canadian species. The legs furnish no characters that we can employ with profit, but it will be noticed that the males have three joints of the anterior tarsi dilated and silky pubescent beneath, the middle tibiæ being pubescent on the outer side.

Of the twelve tiger-beetles reported from Ontario and Quebec, the following five are considered varietal forms only:—*C. Lecontei* figures as a variety of *scutellaris*, *limbalis* and *splendida* both belong to *purpurea*, *generosa* is an Eastern form of *formosa*, and *12-guttata* is subordinate to *repanda*, being simply a variety in which the bands are broken up. The variety of *longilabris*, which is called *perviridis*, is known from Newfoundland, but I think not from the provinces which are directly the

* Zeitschr. f. Entom. Breslau, 1848, Taf. 2. (*C. campestris*.)

subject of this paper. They may be separated among themselves as follows, though occasionally forms will be found which intergrade between varieties to such an extent as to render it difficult to place them correctly from description alone. The arrangement followed is practically that of Schaupp, with such additions and alterations as were rendered possible or convenient by the smaller number of species here treated.

CICINDELA, Linn.

- A. Labrum very long, one-toothed. Thorax flattened, trapezoidal.
 Dull brown or black above, front of head excavated. Elytra distinctly punctate, usually with a slightly bent, nearly transverse median band, and three spots on or near the margin which is not bordered with white.....*longilabris*, Say.
 Green above and beneath, humeral lunule complete.....*perviridis*, Schaupp.
- B. Labrum short or only moderately long. Thorax not greatly flattened, quadrate or trapezoidal.
- b. Thorax much narrowed behind; colours usually bright, either purplish, green, blue or coppery. Markings often very much reduced or incomplete.
- c. Elytra without well-defined median band.
 Markings marginal only, colour purplish-coppery, elytra indistinctly punctured, front of head sparsely pilose.....*Lecontei*, Hald.
 Markings consisting of small white or golden dots, usually marginal only, but discal ones are often present. Colour bright green. Elytra distinctly punctured, front of head not pilose.....*sexguttata*, Fab.
- cc. Elytra with median band distinct. Front of head pilose. Thorax and elytra coppery or greenish coppery, margin green. Body beneath bluish-green. *purpurea*, Ol.
 Thorax and elytra purplish, body beneath blue.....*limbalis*, Lec.
 Thorax green or blue, elytra coppery, body beneath green or blue.....*splendida*, Hentz.
- bb. Thorax slightly or not at all narrowed behind. Colours sober, brownish with white markings which are usually complete.
- d. Markings complete, very broad, connected at margin. Body very hairy, labrum three-toothed. Humeral lunule oblique posteriorly.....*generosa*, Dej.

dd. Markings narrower, complete or incomplete. Humeral lunule with the posterior extremity much prolonged *backward* and but little curved. Labrum three-toothed. *vulgaris*, Say.
 Humeral lunule with the posterior portion incurved ; marginal white line not extending quite to this lunule. Markings complete, not broken. Labrum one-toothed. *repanda*, Dej.
 Humeral and other markings broken up. *12-guttata*, Dej.
 Humeral lunule with the posterior portion very suddenly turned inwards, at right angles to the suture or nearly so. Marginal white line connected with humeral lunule. *hirticollis*, Say.

bbb. Thorax subcylindrical. Markings almost absent. Slender, black, shining, a row of large greenish foveæ near the suture. Apical lunule complete, the other markings usually very much broken or wanting. Labrum one-toothed. *punctulata*, Fab.



Fig. 12.



Fig. 13.



Fig. 14.



Fig. 15.



Fig. 16.

We offer figures of several species, as follows :—*Cicindela sexguttata* (fig. 12), *C. purpurea* (fig. 13), *C. generosa* (fig. 14), *C. vulgaris* (fig. 15), and *C. hirticollis* (fig. 16).

By request of the Editor, a list of other species and varieties reported from the Dominion is subjoined, with localities. They are not included in the table because they are not known from Old Canada, and our knowledge of the fauna of the great region north of the forty-ninth parallel and west of the ninety-fifth meridian is too limited to permit of a synoptic treatment of any completeness. For several unpublished records I am indebted to the kindness of Mr. Harrington and Mr. Fletcher, who sent me lists of the species contained in their collections.

The species are :—

Omus dejeanii, Reiche. B. C., Van. Isl. A large back insect, 18 to 20 mm. in length, the elytra marked with rather deep, irregular foveæ.

O. Audouinii, Reiche. B. C., Van. Isl. Resembles the preceding, but the size is less (13 to 18 mm.) and the elytra simply irregularly punctate. The species of *Omus* do not resemble *Cicindela* in appearance, but approach rather the Carabidæ, from which they may be easily separated by the antennal characters.

Cicindela longilabris, var. *montana*, Lec. Resembles *longilabris* proper, but is black, shining, smoother, the markings absent or only a slender median band present. Has been found in the Northwest Territory. J. B. Tyrrell (teste Harrington).

C. scutellaris, var. *unicolor*, Dej. Like *Lecontei*, but green or blue, without marks of any kind. Taken by J. B. Tyrrell in the Northwest Territory.

C. sexguttata, var. *patruela*, Dej. B. C., Rev. Geo. W. Taylor. This is a variety of *sexguttata* in which the middle band is more or less distinct.

C. purpurea, var. *decem-notata*, Say. This is a form in which the middle band is more deflexed than in typical *purpurea*. The elytra are ordinarily ornamented also with four white dots. B. C. (teste Leconte).

C. formosa, Say. Fort McLeod (teste Fletcher), also in N. W. T. This is like *generosa*, but the ground colour is reddish cupreous instead of brown.

C. hyperborea, Lec. Methy Portage, H. B. T. (teste Leconte). I have never seen this species. It is rather small (12 mm.) reddish cupreous with markings somewhat resembling *vulgaris*, but the hinder portion of the median band is straight instead of being curved.

C. vulgaris, var. *vibex*, Horn. Vanc. Isl., Rev. G. W. Taylor (teste Harrington). A green variety of *vulgaris* in which the median band does not reach the margin.

C. oregona, Lec. A variety of *repanda*, brownish-bronze or olive, middle band not dilated on the margin. White dots large, lunules interrupted. B. C., Van. Isl.

C. pusilla, Say. Hudson's Bay Terr. (teste Schaupp). A small black species, (12 mm.) blue or greenish beneath, with tibiæ pale at base, labrum three-toothed. Elytra with faint basal and apical lunule and recurved median band extended on margin. All but the marginal part of this band is sometimes wanting. Unknown to me.

C. pusilla, var. *terricola*, Say. Black beneath, differs from typical form in having oblique punctures on the elytra, the anterior margin of each puncture being the higher. Hudson's Bay Terr. (teste Schaupp).

C. cincipennis, var. *imperfecta*, Lec. A small species, 11 to 12.5 mm., brown above, the elytra with a long humeral lunule, which is usually connected with the median band. The median band does not touch the margin and its outer part is sometimes connected with the apical as well as the humeral lunule. B. C., A. J. Hill (teste Harrington).

C. lepida, Dej. Elytra white with a few green or bronzed lines. Anus testaceous, labrum one-toothed. Northwest Territory (teste Harrington).

It is to be hoped that the readers of the CANADIAN ENTOMOLOGIST, who have the opportunity to add other species to the lists of beetles of the Dominion, will take care to see that the records of their captures are published, as only in this way can faunal papers be made complete. Personally, I should be very glad to see any *Cicindelas* which appear not to come under the species mentioned in this article, whether in duplicate or otherwise. To those who wish to pursue the study further, the following works are recommended as containing nearly all that is known on the *Cicindelidæ* of North America:—

1818. Say, Thos. A monograph of the North American insects of the genus *Cicindela*. Trans. Am. Phil. Soc., N. S., I., 401-426. Reprinted in Leconte's Edition of the Complete Writings of Thos. Say, Vol. II., pp. 415-435, Boston, n. d.

1856. Leconte, John L. Revision of the *Cicindelæ* of the United States. Trans. Am. Phil. Soc., 2nd Ser. XI., pp. 27-62, Pl. I.

1876. Horn, Geo. H. The sexual characters of North American *Cicindelidæ*, with notes on some groups of *Cicindela*. Trans. Am. Ent. Soc., V., pp. 232-240.

1878. Horn, Geo. H. Descriptions of the larvæ of the North American genera of *Cicindelidæ* * * * Trans. Am. Ent. Soc., VII., pp. 28-37, Pl. II.

1878. Schaupp, F. G. On the *Cicindelidæ* of the United States. Bull. Bklyn. Ento. Soc., I., pp. 11-14, with a plate.

1883. Schaupp, F. G. Synoptic tables of Coleoptera. *Cicindelidæ*. Bulletin Brooklyn Ento. Soc., VI., 73-108, Pl. 1-5. This is the latest work on the subject, and gives descriptions, with coloured figures, of all species and varieties known from North America.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF
CERTAIN SPECIES INHABITING THE ROCKY
MOUNTAINS IN LATITUDE 51° 25'.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

(Continued from page 149, Vol. 25.)

ARGYNNIS APHIRAPE, VAR. OSSIANUS, HERBST.

My local material allied to the European *Aphirape* consists of 22 males, 11 females. These have been studied in comparison with 3 ♂, 1 ♀ typical *Aphirape* from Germany, 2 ♂ 2 ♀ *Aphirape* var. *Ossianus* from Northern Finland, 1 ♂ *Ossianus* from Sweden, 1 ♂ 1 ♀ *Aphirape* var. *Triclaris* from Labrador, and 3 ♂ 1 ♀ *Triclaris* collected by Mr. H. K. Morrison in southern Colorado. In the local series the following relationships are displayed:—One male is *Triclaris*, agreeing closely on upper surface with the Colorado males, but on the under side nearer to the single Labrador male. Five males and four females are *Aphirape* var. *Ossianus*. The remaining 16 males and 7 females are of an intergrade type, combining features of *Ossianus* and *Triclaris*. On under side these compare closely with my Labrador pair of *Triclaris*, having the spots of secondaries mainly surfaced in nacre and very conspicuous. On upper side, however, they are distinctively of the *Ossianus* type.

Triclaris is by some authors considered a distinct species. The examination I have now made results adversely to that view. As above shown, the Laggan material contains over 25 per cent. of examples which are formal *Ossianus*, with about 75 per cent. of specimens combining the character of *Ossianus* upper surface with an extreme degree of *Triclaris* quality below. In order to make a reasonable plea for the distinctness of *Triclaris* from *Aphirape*, it would be requisite to prove that *Ossianus* and *Aphirape* in the European fauna are mutually independent. For *Ossianus* certainly is a resident in the bogs of Laggan, and just as surely the Laggan intergrade series identifies *Triclaris* with *Ossianus*.

In the Laggan series appears nothing very close to typical *Aphirape*. In fact, 75 per cent. of the Laggan occurrence is at the farthest point of separation from *Aphirape*.

Triclaris of Colorado is the North American form nearest to typical *Aphirape*, which it greatly resembles on upper side, and the Laggan form as markedly resembles *Ossianus*. It is also worthy of special note that in *Triclaris* of Colorado, as in typical *Aphirape*, the colour-pattern is

emphatically differentiated for sex ; while in the Laggan occurrence, as also in *Ossianus* of Europe, the sexes differ but slightly in appearance.

Ossianus flies at Laggan during July, or in forward seasons makes its appearance the last week of June. My earliest date for the male is June 22 (in 1888, an early season). It is found at altitudes from 4,900 to 5,600 feet, usually in marshy places. It is not common anywhere in the district, but occurs more freely than elsewhere in two subalpine bogs about a mile south of Laggan, at 5,400 and 5,500 feet. I have taken the female at Stephen, B. C., (5,290 feet), and the male at Emerald Lake (5,600 feet). At Emerald Lake occurred also the single instance of formal *Triclaris* previously mentioned.

A METHOD OF SECURING MOTHS' EGGS.

BY JOHN B. LEMBERT, YO SEMITE, CAL.

A practical way of procuring moths' eggs came under my observation last season and the season before, through an *Arctia ornata* ♀ that I sent to Mr. Dyar while he was in Portland, Oregon.

When I take an *Arctia ornata* ♀, and she is ready to lay eggs, the moment she shows signs of being stupefied in the Cyanide bottle I take her out, close the wings over her back, and place her in a paper envelope ; as soon as she revives, she will commence to scratch the paper with her legs ; I then shake the envelope, and if she has given up some eggs, I take them out, give her another dose of Cyanide fumes, and when she revives a second time I have found as many as 125 eggs in the paper. After she has given up this quantity the ♀ usually dies, even when left to her own ways and means, and I have found them dead as perfect as when they had just issued and were alive.

Euchaetes sciurus, *Arctia rufula* and *Spilosoma vestalis* will give up eggs in this way also, and die like *Ornata*.

A *Lepisesia Clarkia* ♀ has given up an egg in the Cyanide bottle, but as it is so easily killed by the Cyanide fumes, I never tried to get eggs from it in that manner.

Of butterflies, the *Colias Behrii* ♀'s have given up one and two eggs at a time in this way. The method can no doubt be improved on, and, by careful manipulation, the eggs of a great number of butterflies can be obtained in a short time by those intending to rear larvæ, and where the food-plant is known it will make work so much easier for the entomologist.

I my remark, also, that in a tube the eggs of *Spilosoma vestalis*, without the aid of any plant moisture, take about three weeks to hatch, as do also those of *Arctia ornata*, if not longer.

NEW CYNIPIDAE.

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

RHODITES, Hartig

R. AREFACTUS, *n. sp.*

The galls are dense, corky enlargements of small shoots, usually close to the stem from which the shoot arises, and the shoot is usually dead beyond the gall when the latter is mature. The galls are irregular in shape, vary from one-half to seven-eighths of an inch in diameter, and are polythalamous. The surface is of a rusty colour, is finely wrinkled, and reminds me of dried fruit. The surface appears dry and hard, but it is easily dented with the finger-nail and is always free from spines.

Described from eighteen galls collected in March in the vicinity of Fort Collins, Colorado. Galls brought into the laboratory March 7th, began giving flies March 23rd.

Gall-flies.—Females—General colour, cinnamon-rufous; head entirely rufous, except a blackish area between either compound eye and the mouth; under a power of 60 diameters the lower face appears rather coarsely wrinkled, the wrinkles converging towards the mouth, the upper face, vertex and occiput very finely rugose; the face sparsely set with a short gray pubescence; antennæ short, the first three joints, and sometimes the base of the third, rufous, the remaining joints black; number of joints, 14. *Thorax*, rufous above, with a black suture separating the mesothorax and scutellum, parapsidal grooves entire, broad, moderately deep, well separated at the scutellum, and with numerous elevated lines crossing them; median groove distinct and extending well forward. The surface of the thorax is finely rugose, and, in a proper light, shows numerous punctures, each puncture bearing a short yellowish hair. Scutellum, coarsely wrinkled near the margin, and less coarsely wrinkled on the central portion, which is considerably elevated, transverse groove at base, colour rufous. Mesopleura, except spot just beneath the wings, rufous, sutures, metathorax and sternum black or blackish; entire pleura rugose. *Abdomen* rufous, with venter and posterior half of dorsum blackish, all abdominal segments covered with a microscopic network of impressed lines, most prominent on the terminal segments. *Wings* but little smoky, radial area not at all closed along the costal margin, areolet distinct and rather small. *Feet*, including the coxæ, entirely rufous, the claws only being black. Length, from $3\frac{1}{2}$ to $4\frac{1}{2}$ mm.

Described from twenty-one specimens bred from the galls.

Males—Three to three and one-half mm. in length, black, feet more reddish in colour than in the females, bases of the coxæ black, antennæ black throughout; otherwise like the females.

Described from forty-two bred specimens.

There is one male among those reared that has the rufous marking of the female on head, antennæ and thorax.

This species resembles very closely *Rhodites multispinosa*, Gill, but the galls are very different.

R. NEGLECTA, n. sp.

The gall is an abrupt, corky enlargement of a small stem, and contains numerous larval cells. The gall measures 15 mm. in breadth by 18 mm. in length, and is very smooth on the exterior.

Described from a single gall taken at Manitou, Colorado, May 8, 1892. The flies emerged on the 17th of the same month.

I have long known what I suppose to be the same gall in Michigan and Iowa, but never before succeeded in getting the gall-makers from them.

Gall-fly.—Female—*Head* black, except a little rufous upon the vertex and clypeus; face rather coarsely rugose, vertex and occiput finely rugose; antennæ entirely black and 14-jointed. *Thorax* entirely black, parapsidal grooves well defined and broadened anteriorly, median groove traceable but a short distance from the scutellum. Surface of the mesothorax shining, but under a low power of the microscope is seen to have a fine network of impressed lines and numerous shallow punctures over the entire surface; from each puncture arises a small yellowish hair. Scutellum black, slightly rufous on middle of disk, coarsely rugose about margin, less coarsely on the central raised portion. Pleuræ and mesothorax black and coarsely to finely rugose, most finely on the central portion of the mesopleuræ beneath the forewings. Abdomen black, except sides of second segment near the base, the seventh segment and the anterior portion of the venter. All the surface of the abdomen is covered with a network of microscopic impressed lines. *Wings* slightly smoky, radial area not at all closed along the costal margin. *Feet* rufous, except coxæ, which are blackish. Length, $2\frac{1}{2}$ to 3 mm.

Described from two bred females.

Male—Except feet, entirely black; length, $2\frac{1}{2}$ mm.; otherwise like females.

Described from one bred specimen.

R. FULGENS, n. sp.

Gall unknown.

Gall-flies.—All females, measuring from $2\frac{3}{4}$ to 4 mm. in length; general colour, rufous. *Head*, dark rufous, beneath the eyes and back of the eyes at the sides of the vertex washed with blackish; in small individuals the head is darker in colour, in some entirely black, with the exception of a narrow streak in the middle of the face; there is also, in every case but one, some rufous colouring upon the genæ. Lower face rather coarsely rugose, vertex and occiput finely rugose, ocelli and compound eyes whitish, in one case red, in no case black; antennæ 14-jointed, the first three joints rufous, the remainder black. *Thorax*, rufous quite dark in the small individuals, parapsidal and median grooves well defined, all extending to the collar; ridges outside the parapsidal grooves and between these and the median groove smooth and shining and sparsely punctured. Under a power of 60 diameters these smooth polished portions are seen to have the fine network of impressed lines which is so constant in this genus. Scutellum coarsely rugose towards the border, where it is blackish, more finely rufous on the raised central portion; no foveæ, but the usual transverse groove. Metathorax, a patch on mesopleura beneath the wings, and sternum black; in small specimens the whole mesopleura is black, except a shining rufous spot beneath the wings, entire pleuræ finely to coarsely rugose. *Abdomen* rufous, somewhat blackish on dorsum and venter, all the segments covered with the network of impressed lines, but they are too fine to be seen with a low power on the sides of the second segment. *Wings* slightly and evenly smoky, nervures slender, with no cloudiness surrounding them, brown in colour, the heaviest not being black, areolet medium, radical cell not at all closed along the costal margin. *Feet*, including coxæ, entirely rufous, in the smallest and darkest individuals the coxæ somewhat blackish at base.

Described from 17 flies sent me by Prof. J. M. Aldrich, from S. Dakota, and 11 flies bred in this laboratory. The galls in both cases have been lost or confused with others. The flies are at once separated from *R. multispinosa*, *R. arefactus*, and what I suppose to be Riley's *R. tuberculator*, which they much resemble, by the polished mesothorax and the greatly developed median groove.

WASHINGTON PHALANGIDA, WITH DESCRIPTION OF A NEW SOUTHERN LIOBUNUM.

BY NATHAN BANKS, SEA CLIFF, N. Y.

During the past few years Mr. Trevor Kincaid, of Olympia, Washington State, has kindly sent me many interesting arachnids from that region. Among them quite a number of phalangids, some of which have been described, others will be given in this paper. Previous to my descriptions of Californian and Washington phalangids of last year, but one species (*Liobunum exilipes*, Wood) was known from the Pacific region; I have described and recorded fifteen others. These, with the four new ones described below, make a total of twenty; probably as many more remain to be described. To an Eastern student this fauna is very interesting because of the number of peculiar forms not known in the Eastern States. The families and genera may be separated by the following table:—

1	{	A compound claw to posterior tarsi, palpi very spiny. (Phalangodidæ) <i>Sclerobunus</i> .
	{	All tarsal claws simple. 2
2	{	Last joint of palpus with a claw..... (Phalangidæ)..... 6
	{	Last joint of palpus without a claw. 3
3	{	Palpi very short, coxæ united..... (Trogulidæ) <i>Dendrolasma</i> .
	{	Palpi long, coxæ separate..... (Nemastomidæ)..... 4
4	{	Mandibles longer than body..... <i>Taracus</i> .
	{	Mandibles shorter than body... .. 5
5	{	Palpi slender..... <i>Nemastoma</i> .
	{	The joints much swollen <i>Phlegmacera</i> .
6	{	Femur I. longer than body, palpal claw denticulate, lateral pore oblong <i>Liobunum</i> .
	{	Femur I. shorter than the body, palpal claw smooth, lateral pore nearly circular..... 7
7	{	Eye-tubercle and anterior margin of cephalothorax spiny..... <i>Homolophus</i> .
	{	Eye-tubercle and anterior margin smooth..... <i>Leptobunus</i> .

SCLEROBUNUS, Banks.

Both species of this genus occur in the State.

Colour red, tips of legs black..... *robustus*.

Colour brown, tips of legs yellowish..... *brunneus*.

Sclerobunus robustus, Pack.

Phalangodes robusta, Pack. The Cave Fauna of North America, 1888.

This species is quite common from Colorado north-westward to the Pacific.

Sclerobunus brunneus, Banks. Trans. Am. Ent. Soc. 1893.

This is not uncommon near Olympia.

TARACUS, Simon.

Taracus pallipes, n. sp.

Length of body, 6 mm. ; mandibles, 9 mm.

Colour—Cephalothorax pale, with a broad, black, median stripe, as wide as the base of the mandibles ; abdomen dark gray above with black spots ; venter pale, darker near tip ; legs pale, except tarsi, which are mostly black ; mandibles black ; palpi pale, except last joint, which is dark brown.

Cephalothorax smooth, with a prominent median spine behind the eye-tubercle, the latter with several small projections, each tipped with a hair ; anterior margin of cephalothorax strongly bi-emarginate. The dorsum of the abdomen has many conical tubercles of various sizes ; none, however, large ; they are somewhat irregularly arranged in transverse rows ; these tubercles are black, and have their base surrounded by a black ring. Femur II. is as long as the basal joint of the mandibles, which is equal to three-fourths of the body ; the femur of the palpus is longer than the femur of leg I. and shorter than femur II. ; the last joint of palpus is about one-fourth the length of the penultimate joint ; the basal joints of the mandibles have many small elevations, each bearing a hair.

Locality—Washington State, one male and one female.

This species is larger, much less spiny, and darker coloured than *T. spinosus* ; the mandibles slightly longer and the legs more slender than in that species. Some young specimens, one millimetre long, have the mandibles much shorter than in the adult, thus plainly showing that the genus has developed from forms with normal mandibles.

PHLEGMACERA, Packard.

Phlegmacera occidentalis, Banks. Psyche, Feb., 1894.

This species is quite frequent near Olympia.

NEMASTOMA, Koch.

Nemastoma modesta, Banks. Psyche, Feb., 1894.

This is common in California and Washington.

DENDROLASMA, Banks.

Dendrolasma mirabilis, Banks. Psyche, Jan., 1894.

Uncommon ; I have but two specimens.

LIOBUNUM, Koch

The three species known to me may be separated as follows, applying especially to the males :

Palpus with tibia, patella and tip of femur dark brown,
dorsum mostly blackish *exilipes*.

Palpus and dorsum paler.

Spinules on venter and coxæ, trochanters brown, a brown
median stripe on dorsum. *pacificum*.

Only stiff black hairs on coxæ and venter, trochanters pale,
a large cruciate mark on the abdomen..... *parvulum*.

Liobunum pacificum, nov. sp.

Length, ♂ 4.2 mm.; femur I. 5.8 mm., tibia I. 4.5 mm., femur IV. 9 mm., tibia IV. 6.8 mm. Dorsum, dirty white to gray, with a broad median brown stripe above, which is nearly equal in width throughout, barely wider at middle of abdomen; two diverging white stripes run from the eye-tubercle to the anterior margin of the cephalothorax; a few brown spots on each side of cephalothorax; venter coxæ and palpi whitish; legs dirty white, trochanters brown, patellæ and tips of femora and tibiæ light brown, tarsi brownish; basal joint of mandibles with a brown line above. Eye-tubercle moderate, with a few blunt processes above. Palpus with spinules, largest on femur; none of the joints have their angles prolonged; tarsus nearly straight, as long as patella plus tibia, claw with a few small teeth near base. Dorsum of abdomen granulate. Coxæ, trochanters, sternum and ventral segments with spinules; a white spine on inner tip of coxæ I. and II.; legs with short stiff hairs, three or four false articulations in metatarsus I., none in tibia II.

♀ length, 7 mm., femur I. 6.2 mm. Similar to the ♂, but the brown stripe is usually broken up into small patches on the cephalothorax, and indistinct on the posterior half of the abdomen; the spinules on the palpi are smaller, and there are but three or four on each side of each ventral segment.

Sometimes the legs are brownish and the dorsum suffused with brown.

Numerous specimens, ♂ and ♀, from Olympia, Washington.

Liobunum exilipes, Wood.

Phalangium *exilipes*, Wood, Bull. Essex Institute, Vol. VI., p. 23. This was described from California and Nevada; I have a number of specimens which agree quite well with the description, but in most of them there is a broad yellow band near the middle of the abdomen,

behind which the dorsum is much spotted; in front it is black, with a few spots on each segment; the patellæ of the legs are dark brown; only in a few specimens are the white lines in front of the eye-tubercle bent to form a white margin; the palpus has the tibia, patella and tip of femur black only in the male.

Olympia, Washington, ♂ and ♀.

Liobunum parvulum, nov. sp.

Length, ♂ 4 mm.; femur I. 5 mm., tibia I. 4 mm., femur IV: 7 mm., tibia IV. 5.2 mm. Dorsum grayish, with a large spot on abdomen in the form of a Greek cross, mostly brownish, but paler within, the truncate tip reaching just beyond the middle of the abdomen; on the cephalothorax several dark brown patches, more or less connected; no distinct lines from the eye-tubercle to the anterior margin; palpi whitish, with a brown line above on patella and base of tibia; venter, coxæ and trochanters white; legs pale, with broad brown bands at tips of femora and tibiæ, less distinct ones on middles of these joints; patellæ brown, tarsi mostly blackish. Eye-tubercle very low and smooth. Coxæ, trochanters, venter, sternum, palpi and legs with short stiff black hairs, no spinules, a white spine on inner tips of coxæ I., II. and III. Several false articulations in metatarsus I., three or four in tibia II. Tibia of palpus straight, much longer than patella, tarsus slightly curved; about as long as tibia plus patella; claw with a few fine teeth near base, none of the angles of the joints prolonged.

♀ Length, 5 mm.; femur I. 4.2 mm. Similar to male; mandibles slightly brownish, margin of abdomen deeper gray, ventral segments with a few brown spots. The ovipositor is extruded; it is about half as long as body, cylindrical and ringed, blackish in the middle.

Two males and one female, Olympia, Washington.

LEPTOBUNUS, Banks.

I have several specimens of a species belonging to this genus, but as they are all young, I will not describe them.

HOMOLOPHUS, Banks.

I would consider *Mitopus biceps*, Thorell, as a Homolophus, though the last joint of the palpus is longer than the two preceding; a better character for the genus is the presence of the two prominent supra-mandibular teeth. *Mitopus*, Thorell (of which *M. Morio*, Fab., was made the type), differs from *Oligolophus* in having no spines to the femur of palpus. *O. montanus*, Bks., would thus be a *Mitopus*. From Washington and

Idaho, I have another species of *Homolophus*, differing from *H. biceps* in the longer body, more spinose character, and in coloration.

Homolophus punctatus, nov. sp.

Length, ♂ 4 mm., breadth, 2 mm.; femur I. 2.6 mm., tibia I. 2 mm., femur IV. 4 mm., tibia IV. 3 mm. Dorsum pale brownish, with a great many small white spots and darker brown punctures; eye-tubercle with a broad white stripe above; a bifid white stripe from eye-tubercle to anterior margin; venter, sternum and coxæ whitish, stigmata and some spots on the venter, brown; trochanters white; legs brownish, darker on patellæ and ends of tibiæ; palpus with tibia, patella and most of femur black, tarsus paler; basal joint of mandibles brown above. Dorsum with many spinules, a pair of elevations on anterior margin of cephalothorax each bearing eight or ten small spines; two rows of small spines above on eye-tubercle; two prominent white supra-mandibular teeth; lateral pore nearly circular; no spinules on coxæ except on sides near tip; a white spine on inner tip of coxæ I and II; sternum and venter smooth; legs with femora, patellæ and tibiæ quite stout, and with spinules; a false articulation in metatarsus I., none in tibia II.; palpus short, basal joints very stout, with a few spinules and many short, stiff, black hairs; tarsus curved, not quite as long as tibia plus patella, with blunt spinules beneath; claw smooth.

♀ length, 5 mm., breadth, 2.4 mm. Similar to male, but the median stripe is more distinct.

One ♂ Olympia, Washington; one ♀ Bear, Idaho [L. M. Cockerell].

Liobunum flavum, nov. sp.

Length, ♂ 5.5 mm., breadth, 4 mm.; femur I. 1.3 mm., tibia I. 8 mm., femur IV. 17 mm., tibia IV. 12 mm. Wholly yellow, an indistinct trace of a brown vase-mark on abdomen, patellæ of legs faintly brownish, tarsi whitish; cephalothorax with a few yellow-brown spots; eyes black. Dorsum hard, nearly coriaceous, covered with spinules; venter, sternum, coxæ, trochanters and femora with spinules, quite large on the coxæ; cephalothorax broad; eye-tubercle with a few spinules; a row of plates on each side of each coxa; a spine on inner tips of coxæ I, II. and III.; several false articulations in metatarsus I. and two or three in tibia II.; palpus slender, with a few spinules, tibia but little longer than patella, tarsus curved, longer than tibia plus patella, claw with a few small teeth near base.

♀ Length, 8 mm., femur IV. 13 mm. Similar to ♂, but a little more brownish, legs shorter and more reddish, fewer spinules on the venter, body softer.

One ♂, Shreveport, La.; one ♀, Harper's Ferry, W. Va.

The appearance of this species is somewhat like *L. verrucosum*, but the trochanters are pale and there is no golden tinge. It is more closely related to *L. ventricosum*, but has longer and lighter legs, with a more spinose body.

FLORIDA APHORURIDÆ.

[The following letter was communicated to me by Dr. Leonhard Stejneger, U. S. National Museum, through Mr. E. A. Schwarz. It is of particular interest, giving new localities for two species and adding one to our faunal list. ALEX. D. MACGILLIVRAY]:—

During my sojourn in Florida, 1892-93, I happened to collect some small insects, Collembola, of the family Lipuridæ. As I suppose very little, if anything, is known about the representatives of this group from that country, I presume every little contribution to the knowledge must be of a certain interest, and I thus take the liberty of writing you this letter. I have found three species, and my friend, Dr. H. Schott, who is a specialist in this matter, has assisted me in classifying them. The first species is the small white *Lipura** *inermis*, Tullberg, easily recognized as entirely wanting anal spines ("spinae anales"). It was known before this from Sweden, Finland, Sumatra and California, and probably from Germany and Italy. Thus it is widely distributed, but it must, anyhow, be very interesting to have it ascertained from a place so far distant from the other ones as Florida. In that State I found it twice. Both times it was walking about on top of the water at the border of a small lake not far from Clarhana, on the Orange Belt Railroad, in Orange county.

The second species is *Anurida Tullbergi*, Schott. It is a good deal larger and blackish with a faint blackish tint. Characteristics for this species are that the "*organa postantennalia*" show not less than 24-28 small rays or corpuscles (even called "tumors" and "elevations," but I do not find those terms expressive). Till this time, strange to say, it is only recorded from Sweden and Finland. I found it at the same place and living together with *Lipura inermis*.

The third species is *Anurida maritima*, Laboulbene, with only 7-8 shorter and thicker corpuscles in the *organa postantennalia* and three of the same kind in the tip of the antennæ, which Dr. Schott calls antennal organ. This species is already known from the Swedish West Coast, England, France and North America. I hardly think from Florida, though, till I found it on Key West. When walking along the shore, turning over stones in the water and looking for Blenniids and other fishes, I suddenly, under a piece of lime rock, not far from the hospital, found a great number of this little insect. It was high, or at least rising, tide, and they were

*I have changed this name to *Aphorura*, *Lipura* being preoccupied. See CAN. ENT. XXV., 1893, 313. A. D. M.

collected in a hole on the inferior side of the stone, about one foot below the surface of the water. When I turned the rock they floated on the surface of the sea. A good many of these specimens were young and not full grown.

Hoping these facts will be of some interest for you,

I have the honour to be,

Yours very respectfully,

DR. EINAR LÖNNBERG,
Docent Zoology R. University, Upsala, Sweden.

NOTES ON THE NEURATION AND RELATIONSHIPS OF PIERIDI AND ANTHOCHARIDI.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

(Editor of the *Entomologist's Record*, Etc).

I little thought when I wrote my short note (*ante*, pp. 47-48) that the American species of *Anthocharidi* were in such a muddle as Mr. Dyar has quickly proved them to be. It will be very necessary to go much further now with the question, and I would suggest that those who have the opportunity should, during this season if possible, and next season if it be now too late, examine critically and make drawings of the eggs, larvæ and pupæ of the Anthocharids in question and publish them in the CANADIAN ENTOMOLOGIST, where they can be examined by British workers and compared with European species. Evidently, as the American species in question are widely distributed, it will want a number of willing hands.

It must be very evident to all scientific lepidopterists that however excellent a means of subdivision the neuration may present, yet it is only one character of a great many that have to be considered. The neuration I consider gives us a *prima facie* reason for certain groupings, and I have but little doubt that the other stages of the insects' life will in the main substantiate the primary groups thus obtained.

The American species of the genus *Pieris* seem to be very homogeneous and the genus fairly defined; it will have to be left to American specialists to determine the position of *Nathalis iole*. (The true members of *Pieris* have six subsegments in the larva).

The species *creusa*, *sara*, *julia*, *Morrisoni* and *stella* would appear to belong to *Euchloë*, *i. e.*, they have the neuration (*Ante*, p. 47. fig. 3.) of that genus.

The neuration of *Ausonides olympia*, *coloradensis*, *hyantis* and *creusa* is of a type differing from any British species, but falling intermediate between *Euchloë* (where 6-9* are on a stalk) and *Leucophasia* (where 6-11* are on a stalk), since Mr. Dyar describes them as having 6-10 on a stalk. It agrees, however, exactly with that of the European species *belia* which I note as follows:—"It differs from *Euchloë* in as much as that part of the cell normally between the bases of 6 and 8 (agreeing with my nomenclature, p. 47), is contracted to a point, and consequently 6 starts almost from base of 8; 10 also starts beyond the cell." It would appear, therefore, that this group of American *Anthocharids* will fall in generically with *belia*. The neuration of *belia* may be figured thus (Fig. 17):

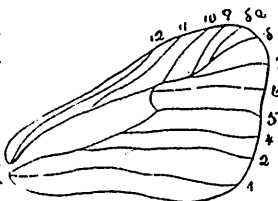


Fig. 17.

*Nomenclature following that used by Mr. Dyar.

It is evident that the primitive lepidopterous pupa was one which had a considerable amount of free movement. Dr. Chapman, whose excellent work on this subject should be read by all lepidopterists (*Vide Trans. Ent. Soc., Lon., 1893, Ent. Record, 1894, p. 25*), has come to the conclusion that those pupæ which are the most solidified and have the fewest number of moveable segments are characteristic of the highest developed species, so far as the term "highest" refers to the greatest amount of differentiation which has been undergone from the primitive type. In this particular it will be seen that if we take the white butterflies or *Pierinæ* and consider the groups *Pieridi* and *Anthocharidi* the latter are much more specialised than the former, for, whilst most of the pupæ of the *Pieridi* have two moveable abdominal segments (5 & 6), when we examine *Euchloë cardamines* and *Leucophasia sinapis* we find the movement entirely gone and the pupa solid.

It is also worthy of note that this development of the pupa on which Dr. Chapman relies so strongly is accompanied in these two groups, so far as I have been able to learn, by an increased complexity of neuration, caused, if I may say so, by a gradual atrophy of the discoidal cell, and so gradual and continuous are the proofs of these developments that there seems no real reason for the separation of the two groups which appear to form a true and comprehensive whole.

The simplest form of neuration we get in our British species of white

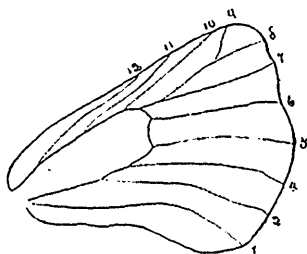


Fig. 18.

butterflies is that of *Aporia* which runs as shewn in Fig. 18.

Pieris is also a very simple type of neurulation (vide ante, p. 47, Fig. 2) where 9 is absent and a nervure, which I prefer to call 8a, takes its place at apex.

The next step forward is to *Euchloë* (ante, p. 47, Fig. 3), where nervure 8a of *Pieris* and 9 of *Aporia* are both developed.

This is followed by the neurulation of *belia* (vide Fig. 17), above, where 6, 7, 8, 8a, 9 and 10 all come from one stalk, 11 only coming from the top of the cell. The highest point of development in this direction is reached in *Leucophasia*, Fig. 19.

I have also examined the exotic species, *Delias eucharis*, which comes nearest to *Aporia* (Fig. 18), but lacks 10; and *Teracolus danaë*, which comes very near *Aporia*, 7 coming, however, from apex of cell with 8.

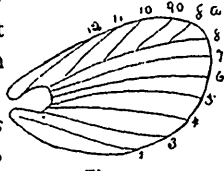


Fig. 19.

It is very evident that there is plenty to do in these groups before we can suppose we know anything about their real relationships, and that even in the light of our present knowledge our generic arrangement is sadly at fault. I can only hope that these off-hand observations made on a few species, when working for other results, may lead to some arrangement that does not upset the primary structural characters we everywhere meet.

It may be here not out of place to say why I prefer my own system of numbering the nervures. A completely typical butterfly may be said to possess 13 nervures (on forewing) ending on the margin of the wing. Of these, all are rarely (probably never) present, but those that are must have their representatives in the typical butterfly. No. 1, which ends at anal angle, is always present. If, now, we look at a *Papilio*, we see 2, 3 and 4 coming from the base of the cell, 5 from its lower external point. Now, I maintain that this last nervure, which is really a continuation of the lower edge of the discoidal cell, should always be called by the same number; hence, if we call it 5 in *Papilio*, we should call it 5 in every other butterfly, since it is structurally identical in all. Now, if we simply number upwards, as is done by Mr. Dyar (p. 100), we should call this nervure 4 in *Pieris*, because only two come from bottom of cell (3 being

obsolete), thus destroying the analogy evidently existing between *Papilio* and *Pieris*. As, therefore, (so far as I know), no butterfly has more than 12 nervures, and these nervures are not always analogous when numbered straight on, and since it has been customary to call the costal nervure 12 and the two nervures usually arising from the top of the cell 10 and 11, I have found it necessary to give the supplementary cell at apex of wing another name, and I call it 8a. to prevent confusion. This is all I have to offer as an excuse to those gentlemen whose susceptibilities I may have offended by my vagary. I am very sorry, but at present I cannot even promise not to offend again.

"Rayleigh Villa," Westcombe Hill, S. E., April 13th, 1894.

NEW SPECIES OF NOTHOCHRYSA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Since 1861, the date of Hagen's Synopsis, only three additional species of Chrysopidæ have been recorded from the United States—one from Florida, one from Texas and one from California. During the past summer I received a short note from Mr. A. P. Morse, of Wellesley, Mass., enclosing a few specimens of Chrysopidæ which he thought might prove new to our collection. When the specimens were studied they were found to belong to the genus *Nothochrysa* and probably new. Upon communicating this fact to him he requested me to describe the species and sent all his material, together with some other miscellaneous Chrysopidæ, among which was found another new species of *Nothochrysa*. The collection also contained specimens of *Chrysopa upsilon*, Fitch, and *Chrysopa chi*, Fitch; the latter was unknown to Dr. Hagen when he wrote his Synopsis, and is apparently rare.

The American species of *Nothochrysa* can be separated by means of the following table:—

- A. Antennæ with the second segment annulated with black.....*annulata*.
- A. A. Antennæ with the second segment not annulated with black.
 - B. Antennæ white, prothorax green, size large.....*phantasma*.
 - B. B. Antennæ and prothorax black, size small*californica*.

Nothochrysa annulata, sp. nov.—Antennæ nearly or quite as long as the wings, basal segment white, immaculate, second segment ringed with black, remaining segments yellowish; head ferruginous, marked with black, as follows; Six dots on the vertex, one at each corner of an imagin-

ary square and one behind each eye, an O-shaped mark surrounding the base of the antennæ, broadest below, interrupted above; a spot between the antennæ, a crescent-shaped mark on the cheeks below the eyes, its anterior horn coalescing with the circle around the antennæ, and the apex of the palpi; the clypeus slightly emarginate; prothorax greenish-yellow, longer than broad, suddenly narrowed in front just before the middle, sides parallel behind the middle, a black dot at each corner and an indistinct transverse band at middle; wings hyaline, slightly annular at apex; pterostigma long, yellowish; the longitudinal veins and the veinlets yellowish white, except the following, which are black: the costal veinlets at base and apex, the radio-subcostal cross-vein near the base of the wing, the base of the veinlets between the first and second branches of radius, the base of the second branch of radius, both series of gradate veins, the base of the veinlets given off from the second branch of radius, the long cross-vein in the anal angle; in the posterior wings, the costal veinlets entirely and base of the veinlets between the first and second branches of radius; twenty-six costal veinlets before the pterostigma, fourteen or fifteen between the radius and its sector, nine in the inner gradate series, and ten in the outer gradate series; legs whitish, tarsi darker; abdomen green, hairy.

Length, 11 mm.; alar expanse, 30 mm.

Habitat—Wellesley, Mass., June.

Nothochrysa phantasma, sp. nov.—Antennæ longer than the wings, white, immaculate, basal segment strongly dilated within; head yellowish-white, immaculate; clypeus emarginate; palpi white; prothorax green, about as broad as long, narrowed in front, sides gradually widened backwards; meso- and metathorax yellowish-white, a purplish dot each side on the suture between the front and lateral lobes of the mesothorax, sometimes wanting; wings narrow, elongate, hyaline; hind wings angular at apex; pterostigma long, white, fuscous at base; the veins and veinlets green or white, except the following, which are black: the second branch of radius, the basal three or four veinlets between the first and second branches of radius, at their base, a spot surrounding the apical cross-vein between media and cubitus, and the gradate veins; in some immature specimens none of the veins are black; the veins and margin hairy; hairs short, white; twenty-six to twenty-nine costal veinlets before the pterostigma, sixteen to seventeen between the radius and its sector, eight to ten in the inner gradate series, seven to nine in the outer gradate series;

legs white, tarsi darker ; abdomen green with a median dorsal yellow line ; fifth dorsal segment with a large brownish spot.

Length, 13 mm. ; alar expanse, 46 mm.

Habitat—West Chop, Massachusetts, July to August.

The following notes on the habits of this species are of interest:—
“This beautiful little insect first attracted my attention while strolling at twilight along the silent leaf-strewn wood-roads of the Vineyard, in the immediate vicinity of West Chop. I first noticed it early in July, and it is still common in mid-August.

“It seems specially fond of oak trees and is nocturnal in habits, being rarely seen by day. When startled from its resting-place by daylight it flutters rapidly and erratically to a neighboring branch or downward to the sheltering undergrowth of huckleberry bushes, which everywhere fill the woods. Shortly after sundown, however, it awakens to activity, and may then be observed as a dimly perceptible paleness drifting silently and steadily through the twilight gloom.

“When taken in the hand, this impalpable apparition resolves itself into a ghostly little elf clad in pale-green and white, with brilliant purple eyes and gauzy wings ; a veritable dryad of the woods.”

Nothochrysa californica, Banks.—Antennæ shorter than the wings, wholly black ; head reddish-yellow, antennal sockets surrounded with black, three black streaks above, connected with the black of antennal sockets, and a few blackish lines below antennæ ; palpi black ; prothorax black, with a median light stripe, broader at each end, and the extreme margin light, narrowed in front, sides gradually sloping ; meso- and meta-thorax black ; wings hyaline, round at apex ; veins mostly black ; costa and base of radius on fore-wing, costa and almost whole of radius on hind-wings, yellowish ; pterostigma brown, throughout its entire length ; sixteen or seventeen costal veinlets before the pterostigma, ten or eleven between the radius and its sector, ten in the inner gradate series, twelve in the outer gradate series ; less testaceous, middle and hind femora darker, tips of tibiæ and joints of tarsi black ; abdomen short, black, the posterior margin of the segments on sides narrowly yellowish.

Length, 9 mm. ; alar expanse, 26 mm.

Habitat—California.

I am indebted to Mr. Nathan Banks, Sea Cliff, N. Y., for notes on this species.

REMARKS ON ZETHUS SLOSSONÆ.

BY WM. J. FOX, PHILADELPHIA, PA.

In the CANADIAN ENTOMOLOGIST for May (page 140) there appears an article by Mr. Wm. H. Patton, entitled "Zethus Aztecus in Florida," in which the author attempts to prove that *Zethus Poeyi*, *Slossonæ* and *aztecus* are the same species. As I am the authority for one of these species, it was but natural that I should make a study of the trio, in order to ascertain if Mr. Patton's assertions were correct. An examination of the material in my possession convinces me that Mr. P. is mistaken, and that his conclusions have no facts to enforce them. In my studies I have had a series of eight female and seven male specimens of *Slossonæ*, three females and one male of *Poeyi*, and a female of *aztecus*. In the first mentioned species, notwithstanding Mr. P.'s statements that the described differences are but variations, the only variations noticed in my series are that sometimes the yellow on clypeus and at apex of petiole are wanting. There is no yellow on the vertex of *Slossonæ*, while *Poeyi* (at least in the specimens before me) has always two large spots there; in general appearance *Slossonæ* is a much more robust insect than *Poeyi*, particularly the head and thorax, and the yellow markings thereon are by no means so promiscuous. *Z. aztecus* is quite a different insect in appearance from both the other species, and scarcely requires a comparison with them. Excluding the characters Patton regards as variations, the species differ as follows:—

POEYI.

Posterior face of metathorax smooth, velvety, not at all striated; enlargement of petiole rather finely punctured.

AZTECUS.

Abdomen black, greater part of legs black, petiole with exceedingly coarse punctures; collar above, anteriorly, with a prominent crest; second ventral, abdominal segment with large shallow punctures.

SLOSSONÆ.

Posterior face of metathorax very coarsely striated; enlargement of petiole tolerably coarsely punctured.

POEYI AND SLOSSONÆ.

Abdomen, except petiole, ferruginous, or claret brown; greater part of legs ferruginous * * * *; collar above, anteriorly, scarcely crested; second ventral segment with fine, sparse punctures.

ON OCHYRIA FERRUGATA, CL.

BY LOUIS E. PROUT, F. E. S., LONDON, N. E., ENGLAND.

I have recently been investigating the synonymy, and the natural history generally, of the two species of geometers which are frequently confused under the above name,* and as Packard was not quite clear about the matter, it seems desirable to call attention to the true position of their American representative. In Germany there has been frequent doubt whether *ferrugata*, Linn., and *spadicearia*, Bkh., were, or were not, specifically identical, and Zeller, to whom Packard owed his information concerning the European forms, came to the erroneous conclusion, though somewhat waveringly (see Stettin *Ent. Zeit.* xxxviii., p. 464), that they were forms of one and the same insect. He held that *ferrugata*, Cl., was really the *spadicearia* form, *ferrugata*, Linn. the *ferrugata* form (according to German usage), but, of course, did not touch the synonymy, believing that he dealt with but one species (Stettin *Ent. Zeit.*, xiv., 249). Now, when he sent examples to Packard, he naturally sent the form which is labelled as typical *ferrugata* in his collection (the darker, purple-banded form = *ferrugata* of Linn., H.-S., etc.). This, as Packard says, agrees entirely with the American species†, and it is this of which the black-banded form (var. *unidentaria* of Packard) is a variety (Stettin *Ent. Zeit.*, xli., 93).

But now, turning to England, we find that the specific distinctness of the two insects (now abundantly proved) has been less questioned, though, unfortunately, Haworth is responsible for considerable confusion of synonymy. Like Zeller, he accepted Clerck's figure (*Icones*, 6, 14) as the lighter red species (= *spadicearia*, Bkh.), but knew nothing of the name *spadicearia*, and introduced the species to British entomologists as *ferrugaria*; the other species, which is generally black-banded in England, though in America purple-banded forms seem common also, he named *unidentaria*.

In brief, *spadicearia*, Bkh. is = *ferrugaria*, Haw., Steph., Newman and perhaps = *ferrugata*, Cl., though his figure is very poor; *ferrugaria*, Linn., H.-S., Zeller, Packard, is = *unidentaria*, Haw., but its earliest name,

* Some of the results of my investigations may be seen in the *Entomologists' Record*, Vol. V., p. 111, etc., London, 1894.

† I have tested this by the material in our National Museum, and by some specimens kindly sent me by Mr. H. F. Wickham, of Iowa City.

assuming *ferrugata* to be preoccupied by the other species, is *corculata*, Hfn., *Berl. Mag.*, iv., 94.

So far as I have ascertained, *spadicaria*, Bkh., does not occur in the New World, and the following of Packard's citations must be deleted, as belonging thereto:—

Ferrugata, Cl. Ic. Ins., 6, 14, 1759 (perhaps).

Hüb., Schm. Eur., 460.

Stph., Nomencl., Br. Ins., 44, 1829.

Stph., Ill., iii., 216, 1831.

Stph., Cat. Br. Lep., 186, 1850.

Also, theoretically, the larval description from Newman's "British Moths," though practically the two larvæ are so similar that the description of one will apply to the other. Nevertheless, it will be well for American workers to bear in mind that our *ferrugata* is not identical with theirs.

PROFESSOR C. V. RILEY.

Every entomologist in North America will, we are confident, join with us in the expression of the deepest regret that Professor C. V. Riley has felt compelled, owing to the impaired state of his health, to resign his position as entomologist of the United States Department of Agriculture. The admirable work that Dr. Riley and his staff have accomplished, both in scientific and economic entomology during the many years that he was Director of the Division, is so well and widely known that it is unnecessary to enter into any details here. There are few who possess in so eminent a degree as Dr. Riley scientific ability, accurate knowledge, painstaking industry and acute powers of observation; these gifts and attainments have been abundantly manifested in the immense additions that he has made to the knowledge of insect life in all its various phases, and it would be a calamity indeed if they were withdrawn from active exercise. It is gratifying, then, to learn that Dr. Riley will retain the honorary Curatorship of the Department of Insects in the U. S. National Museum, at Washington, and that he will now devote himself to some long-contemplated work of a purely scientific character. We earnestly trust that the relief from the cares and anxieties of administrative work in a Government Office will speedily restore his health and strength, and that we shall see the fruits of his labours during many a year to come.

While we deplore Dr. Riley's resignation, we cannot refrain from

expressing our gratification at the appointment of his successor. The authorities at Washington have shown their wisdom in conferring the vacant office upon Mr. L. O. Howard, who has been so long and so ably sharing in its duties as First Assistant. The Department is certainly to be congratulated upon having at hand a skilled and learned entomologist, who possesses in every respect the varied qualifications necessary for the successful performance of so important an office. We have every confidence that the world-wide reputation now possessed by the Division of Entomology at Washington, will be in nowise impaired under the administration of Mr. Howard, and we heartily wish him health, strength and long life for the successful performance of his arduous and important duties.

NOTES.

• MR. C. H. TYLER TOWNSEND has resigned his position as Curator of the Museum at Kingston, Jamaica, and has returned to Las Cruces, New Mexico. He begs that his correspondents will take note of his change of address.

At the recent meeting of the Royal Society of Canada, held in Ottawa (May 22-26), MR. W. H. HARRINGTON, President of the Entomological Society of Ontario, and the REV. G. W. TAYLOR, a member of the Society, were unanimously elected Fellows. The meeting was highly successful, many of the papers read being able and valuable contributions to scientific knowledge. The Governor-General, Lord Aberdeen, was in constant attendance, and treated the members with great hospitality. The entomologists present were especially charmed to meet and welcome Mr. S. H. Scudder, who was one of the distinguished visitors from the United States.

THE POPULAR SCIENCE NEWS (Boston, Mass.), has recently been much improved in form and matter, under the editorship of Dr. James R. Nichols. It is now filled with interesting articles, many of them illustrated, by eminent writers in different departments of science. The last two numbers contain articles by Prof. J. B. Smith, on the "Insect Parasites of Animals."

The first two parts of Mr. P. Wytsman's (79 Rue Neuve, Brussels, Belgium) reproduction of HUBNER'S EXOTIC BUTTERFLIES have been received. Each consists of ten coloured plates, without letterpress. They are very nicely executed on hand-made paper, and are evidently faithful copies both in drawing and colouring of the originals. The work will be completed in sixty parts, and will contain about 600 plates; the synonymy, nomenclature, etc., will be revised and brought down to date by Mr. W. F. Kirby, of the British Museum.

CORRESPONDENCE.

PAPILIO CRESPHONTES.

Sir,—About the 17th of August, a specimen of *Papilio cresphontes* was seen by Mr. Charles Currelley, on the southern shore of Sparrow Lake, about one hundred and ten miles north of Lake Ontario. It was a fine specimen and was flying aimlessly about over the water. I think that this is the most northerly appearance of this insect which has been recorded.

CARLYLE ELLIS, Toronto.

BREPPOS INFANS MOESCHL, AT OTTAWA.

I have much pleasure in recording the capture of a nice specimen of this rare and beautiful moth, at Ottawa. It was taken by Lady Marjorie A. Hamilton-Gordon, who writes. "I caught it in a sunny glade of fir woods, behind Government House, on April 12th. It was among fir trees and stumps. I had seen one there two days before, flying high among the trees. I noticed my specimen crawling up a long stalk, with its wings closed; and then it flew away, more like a butterfly than a moth."

The Ottawa entomologists have been on the lookout for this insect for many years; but, until now, no one has succeeded in securing it. We hope that Lady Marjorie, who is an enthusiastic collector, will be equally fortunate with some of the other insects which ought to be found at Ottawa, but which have not yet been discovered here. J. FLETCHER.

CORRIGENDA.

Sir,—It is, perhaps, worth while to suggest corrections for several errors noticed in recent issues of Canadian Entomologist:—

In October number, 1892, on p. 265, lines 12 to 14 contain an inaccuracy. My observations indicated willow as a food-plant of the larva of *Colias nastes* (not *C. interior*). The record was correctly made by Mr. Fletcher in 1889 (Twentieth Annual Rept. Ent. Soc. Ont., page 7).

An error occurs in March number, 1893. On p. 87, line 20, Banff is mentioned as a Canadian habitat of *Chionobas Brucci*. The correct locality is Hector, B. C.

On p. 54, March number, 1892, Mr. W. H. Edwards mentions my having told him that *Vaccinium* was the food-plant of *Colias interior*. My statement requires correction. It referred to a local species, which at that time I considered as probably *Interior*, but which, with more complete material, has proved to be allied more closely to *Pelidne* and *Scudleri* than to *Interior*.

THOMAS E. BEAN, Laggan, Alberta.

Mailed June 9th.