THE CANADIAN

ENTOMOLOGIST.

VOLUME XVI.

Edited by William Saunders, F. R. S. C.
LONDON, ONTARIO.

ASSISTED BY
Rev. C. J. S. Bethune, D. C. L., Port Hope; J. M. Denton, London, Ont., and E. BAYNES REED, London, Ont.

London:
PRINTED BY THE FREE PRESS PRINTING COMPANY
1884.

LIST OF CONTRIBUTORS TO THIS VOLUME.

BEAN, THOS. E. ..... GALENA, ILL.
BOWLES, G. J. ..... MONTREAL, QUE.
BRUNER, LAWRENCE ..... WEST POINT, NEBRASKA.
CAULFIELD, F. B. ..... MONTREAL, QUE.
CLARKSON, FREDERICK ..... NEW YORK CITY.
DAVIS, WM. L. ..... TOMPKINSVILLE, STATEN ISLAND, N. Y
DEVEREAUX, W. L. ..... CLYDE, NEW YORK.
DIMMOCK, GEORGE ..... CAMBRIDGE, MASS.
EDWARDS, W. H ..... COALBURGH, WEST VA.
FERNALD, C. H. ..... ORONO, MAINE.
FERNALD, MRS. C. H ..... ORONO, MAINE.
FISCHER, PH. ..... BUFFALO, N. Y.
FLETCHER, JAMES. ..... OTTAWA, ONT.
FRENCH, G. H. ..... CARBONDALE, ILL.
FYLES, REV. T. W ..... SOUTH QUEBEC.
GEDDES, GAMBLE ..... TORONTO, ONT.
HAGEN, DR. H. A. ..... CAMBRIDGE, MASS.
HAMILTON, DR. JOHN ..... ALLEGHENY, PA.
HANHAM, A. W. ..... HAMILTON, ONT.
HARRINGTON, W. H. ..... OTTAWA, ONT.
HORN, DR. G. H. ..... PHILADELPHIA, PA.
HOY, DR. P. R. ..... RACINE, WIS.
KEEN, EUGENE L. ..... PHILADELPHIA, PA.
KELLICOTT, D. S. ..... BUFFALO, N. Y.
KILMAN, A. H. ..... RIDGEWAY, ONT.
KIRBY, W. F. ..... LONDON, ENG.
LINTNER, J. A. ..... ALBANY, N. Y.
LYMAN, H. H. ..... MONTREAL, QUE.
MOFFAT, J. A. ..... HAMILTON, ONT.
MURTFELDT, MARY E. ..... KIRKWOOD, MISSOURI.
OSBORN, HERBERT. ..... AMES, IOWA.
RAGONOT, E. L. ..... PARIS, FRANCE.
REED, E. BAYNES ..... LONDON, ONT.
RILEY, C. V. ..... WASHINGTON, D. C.
SAUNDERS, WM. (The Editor). ..... LONDON, ONT.
TAYLOR, GEO. W ..... VANCOUVER ISLAND, B. C.
THAXTER, ROLAND ..... KITTERY POINT, MAINE.
TOWNSEND, C. H. T. ..... CONSTANTINE, MICH.
WEED, CLARENCE M. ..... LANSING, MICH.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., JANUARY, 1884. No. 1

OUR SIXTEENTH VOLUME.

In entering on our sixteenth volume we beg to tender our thanks to the many kind contributors to whom we are indebted for past favors, and to point to the fact that our success has hitherto largely depended on the original papers we have thus secured. During the year death has removed from among us some of our highly valued helpers; LeConte, Chambers and Bailey rest from their labors. The hearty support accorded to our journal by these distinguished entomologists will never be forgotten, but their esteemed counsel can no longer be sought. Death removes the workers, but the work still goes on. From among the younger students of natural history our ranks are being constantly recruited, and to these we must look for a portion of the help we need. We believe that the students of Entomology were never so numerous as they are at the present time, nor were ever facts more carefully noted. The communities of insects are as active and numerous as ever, and what has been recorded of their life history and habits is but small in comparison with that which still remains to be worked out. There is room here for hundreds of laborers, and delightful work for all. Many of our readers have no doubt made original observations which have not yet been recorded, and perhaps the observers have regarded them as not of sufficient importance to publish until rendered more complete by further observation. Many a useful fact in entomological science is lost by such delay. What we should like all our readers to do is to promptly communicate any facts they may have noted which they believe to be hitherto unrecorded, so that others may be helped to occupy the vantage ground thus gained. Our pages are ever freely open to all such communications; they add to the value and usefulness of our journal, and help us in our endeavors to continue to make it a record of original work. We sincerely hope that our readers everywhere will bear this in mind.

We would also remind our members that the annual subscription is now due. Remittances should be made to our Secretary-Treasurer, Mr. E. B. Reed, and all communications for THE ENTOMOLOGIST addressed to the Editor.

DESCRIPTION OF LYCÆNA DÆDALUS, BEHR, AND CORRECTION OF ERRORS IN ITS SYNONYMY.

BY W. H. EDWARDS, COALBURGH, W. VA.

I have received from that indefatigable explorer and naturalist, Mr. W. G. Wright, of San Bernardino, several examples of *Lycæna Dædalus*, ♂ ♀. Up to this date the ♂, as described by Dr. Behr, has been unknown to me personally, and by all recent list makers has been set down as a synonym of *Icaroides*, Bois. Its female is *Aehaja*, Behr., also put down as a syn. of *Sæpiolus*, or rather as one of the dimorphic forms of the female of that species.

Mr. Wright made the ascent of one of the lofty mountains in that region, and says: "Saw nothing on the way up, except that at the camping halfway place were a few of these *Lycænæ* and a *Grapta*. Next day, on going up to the high crest, it was a little cloudy, but not very cold (50° probably), yet not one butterfly was seen during the entire day, though I stayed on the crest, 11,550 feet, several hours. On July 1, 1883, in a high, wet meadow, altitude 6,500 feet, and then at varying altitudes from 6,000 to 8,000 feet, I saw these *Lycænæ*. On 1st they were very abundant; the air was full of them. No other *Lycæna* was present. Later, in wet meadows, on another mountain, up to about 8,000 feet, I saw more of them; also, as before, no other *Lycæna* present. I noted the variety of shades of bronze in the female; some are almost yellow, others have but a tinge of bronze on the anal angle." Undoubtedly, the ♂ ♂ are *Dædalus*, Behr, while the females with them are *Aehaja*, Behr.

Dædalus was described in Proc. Cal. Acad., 3, 280, 1867, from three specimens collected by Mr. Hoffman in the "Alpine regions, round the head waters of the Tuolumne River." These were probably all males; but the sex is not stated. It is described as similar to *Icaroides*, Bd., but beneath, the spots, which in the latter are said to be rounded, in *Dædalus* are transversely elongated; and the discoidal mark of hind wings, which in *Icaroides* is wanting, or represented by a white patch, in *Dædalus* is a black line. It is characteristic of *Icaroides* that the spots are round and the discal mark is wanting, though there are exceptions in both cases; a more constant character is found in the white halo around each spot, which is not seen in *Dædalus*. All the six males of *Dædalus* before me have the spots rounded, but one of the females has most of them elongated, as Dr. Behr describes in the male.

Aehaja is described on same page, and the author says: "This species I received also from Mr. Hoffman, who *found it associated with Dædalus*." The number of specimens examined is not stated. But both sexes of *Aehaja* were described *as alike in color*. As the specimens taken by the Geological Survey almost always came in bad condition, especially with the bodies squeezed as flat as a knife blade, it is not surprising that Dr. Behr mistook some of these for males. That his *Aehaja* agrees with Mr. Wright's females of *Dædalus*, is evident from a type specimen which Dr. Behr sent me at about the date of his description, and which still stands in my collection with his label.

This is the same species also which Dr. Boisduval described, Lep. de la. Cal., 48, 1869, as *Rufescens*. In my Catalogue of 1877, *Dædalus* is set down as a syn. of *Icaroides*, while *Aehaja* is given as a dimorphic form of the female of *Sæpiolus*, *Rufescens* being a syn. of *Aehaja*. I seem to have overlooked the fact that Boisduval described a blue male with the brown female, or *russet* female, as the text says, and this word describes the color, perhaps, better than any other. Boisduval certainly must have been misinformed as to the locality, as he says "it lives on the plains in the interior, in May." Whereas the species is Alpine, and would be taken in midsummer. It is allied to *Sæpiolus* and *Icaroides*, both of which are found in lower elevations.

The synonymy should then be:—

DÆDALUS, Behr.

♀ *Aehaja*, Behr.

♂ ♀ *Rufescens*, Bois.

Although I am not aware that I have ever before seen an example of *Dædalus* ♂, I have had several of the ♀, or *Aehaja*, but cannot state from what particular localities they came.

As the descriptions of both Behr and Boisduval are very short and are scarcely distinctive, and besides are not accessible to most of our collectors, I append my own descriptions of both sexes of this *Lycæna*.

LYCÆNA DÆDALUS, Behr.

Male.—Expands 1.2 inch.

Upper side pruinose-blue, with a metallic lustre when viewed obliquely; costal margin of primaries next base silvery-blue, as is also the inner margin of secondaries, and the last is much covered with long white hairs; hind margin of primaries widely edged by black; of secondaries by a

black line, before which, at outer angle to median, is a black border like that of primaries; in the two median interspaces, next margin, a round black spot to each; sometimes an obscure similar spot in the next interspace above, but usually the black border extends quite to median; also at inner angle, in some examples, are traces of two small black spots; primaries have a black streak on arc of cell; fringes long, on primaries pure white externally, fuscous next margin, on secondaries white, with a few fuscous hairs at the end of the nervules.

Under side white, not quite pure, rather grayish, with a very slight tint of blue at base of secondaries; both wings have the hind margins edged by a pale brown line, crossed by two rows of black spots, one sub-marginal, the other extra-discal; these last small, and in the median interspaces of secondaries have on the posterior side small patches of fulvous; the inner row has usually rounded spots, but occasionally nearly all are elongated, disposed as in the allied species; on the arc of cell of each wing a rather large black bar; secondaries have three spots across basal area, one on costal margin, one in middle of cell, and one on inner margin; in addition to the above described spots is a common marginal row on primaries not clearly defined, rather pale brown discolorations than spots, on secondaries distinct, the outer ones brown, the rest black.

Body above covered by long whitish-blue hairs; beneath white, the thorax with faint blue tint; legs white; palpi white, with hairs in front tipped with black; antennæ black, with narrow white wings; club black above, ferruginous below.

Female.—Same size.

Upper side russet on disks to marginal borders; sometimes much obscured by darker brown; in one example under view the disks and whole surface are black-brown, with an illy-defined brown patch at inner angle; but this, as well as all others, have a fulvous sub-marginal belt on secondaries, on the marginal side of which are round black spots like those in male; in some examples the belt is diffused towards disk; primaries have the discal spot rather larger than in male; the fringes soiled white.

Under side brown-buff, uniform; marked as in the male, all spots rather larger; the thorax beneath gray, with many brown hairs; abdomen nearly color of wings.

The species is allied to *Sæpiolus*, Bd., as well as to *Icaroides*, and the plan of markings of under side is similar in the three. It differs from *Sæpiolus* most decidedly in color of upper side of male, the latter being of

a silvery blue (Bois. says *argento-cæruleæ);* and in the female the color of *Sæpiolus* is fuscous, with more or less blue at base.

Boisduval describes *Icaroides* as *subviolaceo-cæruleæ*, the ♀ *fuscæ*. For *Rufescens* ♂ he says shining blue, *nitide cæruleæ*. The former is of a dull violet blue, the fringes not pure white, rather ashen-white. The latter is metallic pruinose blue, as I see it, with white fringes, and these contrast prettily with the blue. Placed side by side there is no mistaking one of the males for another in those three species.

NOTES ON COLIAS CHRISTINA, Edwards.

BY H. H. LYMAN, MONTREAL.

Dr. Hagen, in his paper on the genus *Colias*,* recently published, discussing the species described by Mr. Wm. H. Edwards under the name of *C. Christina*, comes to the conclusion that it is merely a variety of *C. Edwardsii*, which he regards as only a form of *C. Interior*, Scud., including also under the latter name, *Emilia*, *Astræa*, *Scudderi* ,*Alexandra*, *Occidentalis*, *Harfordii* and *Laurentina*.

I had the good fortune last year to receive from my friend, Dr. Robert Bell, of the Geological Survey, a series of fifteen specimens of this species, which, although not perfect, are very valuable for study ; collected at eight localities in the North-west Territories, extending over 250 miles of trail, the most south-easterly locality being Qu'Appelle, 50° 40' N., 104° 14' W., and the most north-westerly, Duck Lake, 52° 47' N., 106° 15' W. The series consists of 6 males and 9 females. Mr. Edwards described and figured one type of female which is apparently not the most usual one, in fact none of mine answer to the description given by him. The most usual form, as represented by six out of the nine, may be described as follows :

Expands 2–2¼ inches. A dwarfed specimen was only 1$\frac{13}{16}$ inch.

Upper side lemon yellow, slightly suffused with orange, especially on primaries, which have a broad marginal band enclosing a row of yellow spots, which are sometimes defined, but more frequently united into an irregular band. Discal spot generally larger than in the male, black,

* Proc. Bost. Soc. Nat. Hist., vol. xxii., p. 150.

sometimes enclosing an orange dot. Edge of costa rose red. Secondaries without any marginal border, but occasionally with a slight powdering of black atoms near the apical angle. Discal spot large, round, deep orange. A few black scales at the base of both wings. Fringes of both wings rose red. Beneath, greenish yellow, especially the secondaries, basal half of primaries suffused with orange, which does not reach the costa. Costal edge of both wings rose red. Costa and apex of primaries and the whole of secondaries sprinkled with fine black scales. Discal spot as above, but always with a yellow or orange centre. Discal spot of secondaries round, medium sized, silvery white, encircled with reddish brown. At the base of secondaries there is a small pink patch. Palpi yellow, or sometimes rosy at tip, legs rosy, antennæ rosy shaded with brown.

In one specimen the marginal band is almost obsolete, being only distinct on the costa, and with a slight shading of black scales about the ends of the nervules.

One specimen has three submarginal spots near the outer angle of the under side of primaries, the others have no trace of these spots.

Var A. ♀. Marked as in type described above, but albino, the color above and below being greenish white. Discal spot of secondaries above, orange. Two specimens are of this kind, but in one the marginal border is considerably reduced.

Var. B. ♀. Greenish yellow above, both wings very slightly suffused with orange, it being just perceptible on the secondaries. The marginal band only represented by a slight powdering of black scales at the apex. Discal spot of primaries small, oval, deep orange, that of secondaries large, round, and of the same color.

Below similar to ordinary type, with the exception that the orange flush is very slight, and that the discal spot of primaries is smaller and reddish brown.

The whole series of fifteen specimens shows very little variation apart from the albino female and the distinctness or partial obsolescence of the marginal band of the female, the Var. B. described above chiefly differing from the normal form in the absence of the marginal band and in having the discal spot of primaries orange ; but it is the only specimen I have which at all approaches the female figured and described by Mr. Edwards.

The arguments advanced by Dr. Hagen for considering *Christina* a variety of *Edwardsii* may be briefly stated as follows : The Entomolo

gists of the Northern Trans-continental Survey collected in 1882, in Oregon and Washington Territory, 129 specimens of *C. Edwardsii*, among which were two specimens like the one figured by Mr. Edwards as *Christina* ♀ ; other specimens with a faint beginning of a border were taken in copulation with *C. Edwardsii*, therefore the specimen figured by Mr. Edwards as *Christina* ♀ is *Edwardsii* ♀.

No orange male of *C. Edwardsii* has ever been reported, nor were there any among the specimens collected by Dr. Hagen and his associates, but one or two males of *Philodice* suffused with orange have been taken, and one orange male of *Pelidne* from Labrador is recorded by Moeschler ; therefore there is no improbability that a few may exist of *Edwardsii*, and therefore Dr. Hagen comes to the conclusion that *Christina* cannot be separated from *Edwardsii*.

Dr. Hagen also complains that Mr. Edwards, while admitting that *Philodice* varies " in size, in color, in the extent and contour of the marginal border, in the discal spots, in all the markings of the under side, and in the degree of dusting of both sides," nevertheless uses these same characters to separate the larger number of the American species of *Colias*.

Now, though it is admitted that a very large series of *Philodice* may show variations in all of these characters, it is scarcely reasonable to say that no weight should be attached to the fact that in one form nine specimens out of ten are without a certain character, which is present in nine out of ten specimens of another form. Dr. Hagen himself admits nine good species of this genus as occurring in North America, and he surely must use some of these characters in separating these species. At least I fail to see how otherwise *C. Interior* can be separated from *C. Philodice*. Besides it by no means follows that because two species of a genus may vary extremely, all the others will vary to anything like the same extent.

Mr. Strecker, in his illustrated work on Lepidoptera *, page 133, states that *Christina* is only a variety of *C. Pelidne*, and repeats the same in his catalogue.

Mr. Edwards has effectively replied to these statements on page 56, Vov. xiv., of this journal, but I may be permitted to make a few remarks on the same subject.

In the first place Mr. Strecker's geography is sadly at fault when he calls the region immediately west of Hudson's Bay the " New North and

* Lepidoptera, Rhophaloceres and Heteroceres, Indigenous and Exotic.

New South Wales districts of British Columbia," and defines the latter in the list of localities given in his catalogue as "comprising, with the exception of Alaska, all that part of North American north of latitude 49°."

If Mr. Strecker will consult a good atlas he will find that the name British Columbia is confined to the territory lying west of the main range of the Rocky Mountains, and of a straight line running from 55° N., 120° W. due north, and south of latitude 60° N. The remainder of this vast region, exclusive of Manitoba, being known as the North-West Territory of Canada.

I have never heard of the names "New North Wales" and "New South Wales" having ever been given to any part of British North America.

Apologizing for this geographical digression, I would return to a consideration of Mr. Strecker's reasons for considering these species identical.

He says that he has both yellow and orange males and yellow and white females of *Christina*, and that though expanding about a half inch more than *Pelidne* he can find no difference sufficient to separate them, and so regards them as the same species, with a tendency to orange color and great size on the western districts. Why a butterfly travelling westward should become changed from yellow to orange and increase in alar expanse by one third or more is not stated; he simply concludes that it does. However, from Mr. Edwards' remarks, referred to above, it is evident that Mr. Strecker has confounded two or three different species. Four of my specimens were sent to Mr. Henry Edwards for examination, and of them he wrote: "I confess I cannot separate No. 1 (a male specimen) from *C. Keewaydin* of the Pacific States; the females, however, seem different and the species may be good."

The characters which appear to me to separate this species from all forms of *Eurytheme* are as follows:

In *Eurytheme* and its varieties the female, so far as I know, have a distinct border on secondaries.

The females of *Christina* do not have this border.

In *Eurytheme* the sub-marginal spots below are generally distinct.

In *Christina* they are nearly always wanting, only two specimens, ♂ and ♀, out of fifteen showing traces of them.

In *Eurytheme* there is a brownish patch on the costa of secondaries below.

None of my examples of *Christina* have any trace of such a spot.

In *Eurytheme* the discal spot on underside of secondaries is nearly always double.

In *Christina* it is very rarely so, two specimens only out of fifteen having a very minute brownish dot without any silver alongside of the discal spot.

Eurytheme is heavily shaded with black scales at the base of both wings above, and also on both sides of the median nervure of secondaries and between it and the sub-median nervure, while in *Christina* there are generally only a few black scales at the base of each wing just around the thorax, the space between the median nervure and the abdominal margin being yellow. These points of difference may not be sufficient, and it is quite possible that *Christina* may prove to be a northern form of *Eurytheme*, though the occurrence of the true type of *Eurytheme* in this northern district, if a fact, as reported by Mr. Strecker on page 132 of his work referred to above, would militate against such a conclusion. However, at present the intergrades are lacking, and I hold that until these are forthcoming, or these two forms are proved by breeding to belong to the same species, we are entitled to regard them as distinct and to retain the name *Christina*.

I may add that the only other specimen of *Colias* in the collection made by Dr. Bell last summer, was a single male of *Philodice*, taken at Fort Carlton, 52° 51′ N. 106° 13′ W., which, while differing from the general type of that species in having a decidedly broader marginal band, is pronounced by Mr. Henry Edwards similiar to some specimens of that species from the Rocky Mountains.

ENTOMOLOGY FOR BEGINNERS.

SMERINTHUS EXÆCATUS AND MYOPS.

BY THE EDITOR.

Among the most beautiful of all the night-flying moths may be placed those belonging to the genus *Smerinthus*, one of the genera included in the *Sphingidæ*, or Sphinx moths, a name derived from a fancied resem-

blance some of the caterpillars bear in certain attitudes to the famous Egyptian Sphinx. This family comprises some of the most robust and powerful among moths. Dr. Harris thus speaks of them: "In the winged state the true Sphinges are known by the name of Humming-bird Moths, from the sound which they make in flying, and Hawk Moths from their habit of hovering in the air while taking their food. These Humming-bird or Hawk Moths may be seen during the morning and evening twilight flying with great swiftness from flower to flower. Their wings are long, narrow and pointed, and are moved by powerful muscles. Their tongues when uncoiled are for the most part excessively long, and with them they extract the honey from the blossoms of the honeysuckle and other tubular flowers while on the wing."

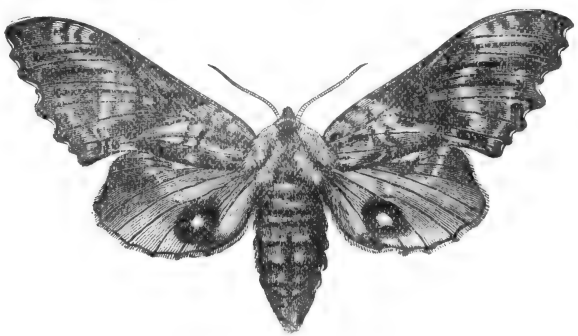


Fig. 1.

The Blind-eyed Sphinx, *Smerinthus excæcatus*, which is well shown in Fig. 1, is a lovely creature which measures when its wings are spread nearly three inches across. Its body is fawn colored, with a chestnut colored stripe on the thorax and a dark brown line on the abdomen. The front wings are fawn colored, clouded and striped with a rich velvety brown. The hind wings are rose colored in the middle, crossed by two or three short whitish lines, having a brownish patch at the tip and a black spot with a pale blue centre near the inner angle. The moth is on the wing in June and July; the eggs are laid on apple, plum and wild cherry trees, and the larva, Fig. 2, becomes full grown in September. It then measures about two and a half inches long, has a green triangular head bordered with white, and an apple green body, paler on the back, deeper in color along the sides, with seven oblique stripes on each side of a pale yellow color, the last one, of a brighter yellow than the others, extending

to the base of the horn. The skin of the body is roughened with numerous white-tipped granulations, and the stout horn on the hinder part of the body is of a bluish green color. This larva when irritated emits a peculiar musical chirping sound.

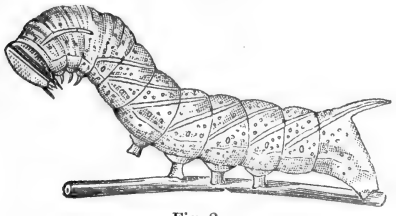


Fig. 2.

When full grown it buries itself in the earth, where it changes to a chestnut brown chrysalis, which is smooth, with a short, rough terminal spine. In this condition it remains during the winter, escaping as a moth early the following summer.

The life history of the Purblind Sphinx, *Smerinthus myops*, Fig. 3, is very similar to that of the species just described. It appears in the perfect state also in June and July. The moth is very handsome. The head and thorax are chocolate brown with a purplish tinge, the thorax is striped with yellow and the abdomen brown marked with yellowish spots. The fore wings are angulated and excavated on the hind margin, and are ornamented with bands and patches of black on a chocolate-brown ground. The hind wings are dull yellow with the outer half a rich brown, and have an eye-like spot towards the inner margin, black with a pale blue centre.

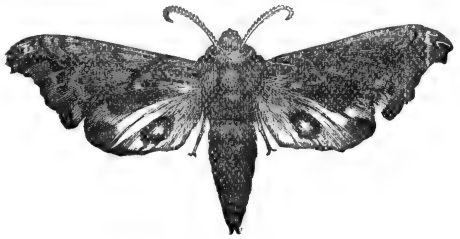


Fig. 3.

The caterpillar much resembles Fig. 2. It is green with two rows of reddish brown spots on each side and six oblique yellow lines, with two shorter lines of the same color on the anterior segments. The head is bluish green, margined with yellow, and the curved horn at the tail green, tinged with yellow at the sides. When full grown it measures about two inches in length, and is nearly cylindrical in form. It feeds on the leaves of the cherry tree, both the wild and cultivated varieties.

The insect passes the winter in the pupa state under the earth; the chrysalis is smooth and of a dark brown color. Both these insects are comparatively rare, and have never, as far as we know, appeared in sufficient numbers to prove injurious to the trees on which they feed.

PREPARATORY STAGES OF CATOCALA ILIA, Cram.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .06 inch. Shape spheroidal, the transverse diameter being about one fifth more than the longitudinal; striated longitudinally with 28 striæ, 15 of these reaching the shallowly punctured apex, these ridges being crossed with a network of slight elevations, the transverse and the longitudinal lines in the middle of the hollows making squares, the interior of these squares being roughened, the corner of each square a little more elevated and enlarged than the sides. Color brownish olive. Duration of this period 234 days.

Young Larva.—Length .25 inch. Color pale gray, one prominent purplish black dorsal line and three less distinct lines on each side. Head purplish black, piliferous spots and hairs the same color. Venter paler than above, with a dark spot in the centre of each joint. Feet, 12. Duration of this period 6 to 7 days.

After 1st Moult.—Length .45 inch. Color pale gray, the markings dark reddish purple; dorsal line distinct, a wavy fainter line midway between this and the subdorsal. The subdorsal line and two others before reaching the lateral piliferous spots, distinct; through the stigmatal region two more or less continuous faint lines and a substigmatal distinct one, making in all 9 distinct and 6 faint lines. A dark ventral spot on joints 4 to 8. The stripes of the body continuous on the head, though darker. Thoracic legs dark purple, first and second pairs of abdominal legs beginning to develop. Hairs and piliferous spots dark reddish purple. Duration of this period 3 days.

After 2nd Moult.—Length .80 inch. The dorsal region in three stripes, the central rather pale gray with a dorsal line in its middle a little darker than the ground color. The outer stripe, reaching to the subdorsal, is blackish gray, not very dark except in places, interrupted on joint 4, the stripe bounded on each side by a wavy black line. The darker blotches in this stripe are between joints 4 and 5, 5 and 6, 8 and 9, and on the anal joint. The subdorsal region has two similar stripes, the upper pale with a central line like the dorsal, the lower line dark, the lower boundary line running through the stigmata. A substigmatal pale stripe has also a dark central line. Venter pale with the dark spots as before. The stripes are more or less continuous on the head. Piliferous spots small, hairs

short and black, the dorsal posterior pair of spots on joints 8 and 11 a little more prominent than the others. All the legs pale except at the tips. Duration of this period 3 days.

After 3rd Moult.—Length 1.30 inches. Color and markings about the same as before, the lines separating the stripes not quite so distinct. The head not striped continuous with the body, but is black across the top and down the sides, with a black parenthesis mark in front a little above the middle on each side; the rest pale. The head had these marks during the last period. The first and second pairs of abdominal legs developed so as to be used. Piliferous spots rather prominent, but concolorous with the body. Duration of this period 3 days.

After 4th Moult.—Length 2.00 inches. In color and stripes about the same as before, except the color has more of a pinkish tinge. The spiracles show more distinctly than before and are gray ringed with black; the stigmatal stripe or line a little more of black than the dorsal. The black stripes on the head are mottled; the one over the top of the head reaching down the sides two thirds of the way to the mouth, an unmottled black spot at the base of the jaws, another mottled stripe lower down from the jaws back. This is lower on the head than the one that runs over the top. Front of head and sides of face pale whitish mottled with pale pinkish gray. The 6 ocelli on each side black. Slight fleshy fringe along the sides.

Mature Larva.—Length 2.50 to 2.60 inches. Width of head .20 inch, the length about the same, width of middle of body .40 inch. The color of body gray in nine more or less distinct stripes, three dorsal and three on each side, the dorsal faintly purplish and the lateral faintly yellowish, the arrangement and boundaries of the stripes the same as above. The posterior dorsal piliferous spots to each joint are more prominent than the others, have a kind of horny look and slightly ochraceous tinge, all the spots partaking a little of this. Stigmata black. Venter rose, somewhat purplish with the dark spots in the centre of joints 4 to 8 and traces of these in the others. Legs pale, spotted a little. Ocelli black, jaws black, antennæ and palpi pale. Duration of this period from 6 to 9 days.

Chrysalis.—Length 1.45 inches, of wing and tongue cases, .80 inch, these reaching to the posterior part of joint 5. Width of thorax .45 inch, depth of thorax .40, depth of joint two, .40; joint three, .43; joint four, .42; joint five, .40 inch, from which it tapers in a cone backwards. The outside of the abdominal joints punctured, with the exception of the last two. Wing

cases, head and thorax finely rugose; a very slightly elevated median smooth line over the head and back of the thorax. Tip of the abdominal joint coarsely wrinkled and tipped with 8 hooks, the two outer the longest. Color dark brown covered over with white pruinescence. The cocoon is made, as in the other species, by fastening leaves together, lined a little with silk mostly where the tip of the abdomen comes and into which the hooks are fastened. Duration of this period 41 to 42 days from the time of spinning to yielding the imagines.

The eggs were deposited Aug. 15, 1882, by a single female that had been confined under a screen two or three days, 44 being obtained in all. They began hatching April 3, 1883, began pupating April 30, and the imagines appeared from June 8 to 11. This gives us a period of 297 days as a minimum of time from the egg to the imago, allowing the eggs to be deposited at the time of year these were. As the species occurs through the whole of the Catocala season, it is probable that the eggs are deposited at different times during the summer. I can not say whether they are single brooded or double, but am inclined to the opinion that there is only one brood in a season from the same parentage, and that the continual recurrence of individuals through the season is due to the difference in development of individuals from the same brood of eggs, and perhaps in part to the difference in time of depositing of the eggs. In a brood of eggs of *C. Amatrix* I found a month's difference between the first and last of hatching, so that I had larvæ in the first stage and mature larvæ at the same time. Only a few of the eggs of this species hatched, and of these only three passed through all their transformations. If a large number of eggs, as for instance all that may be deposited by a single female, in their hatching showed as much difference of time as did the *C. Amatrix* eggs, this would account for at least a month of the time this species is seen flying. All the species I have reared require about a month for the growth of the larva, and another month for the pupal period. If the different species are about uniform in this respect, then most of the species must be single brooded, for they do not have an average time of flying sufficient to allow of a second brood from the time of the appearance of the first specimens of the season till they cease flying. But the extra heat of summer may accelerate their development as it does other insects, and in that way give us more than one brood of some species, hence with *Ilia* and a few others the question of the number

of broods is still an open one, but it can hardly be with such species as *Illecta, Insolabilis* and many others.

The eggs were kept through the winter in a room away from any fire, but not allowed to freeze. At the time of hatching the temperature was about that of the open air. At this time the oak buds had scarcely begun to swell. These were cut open and the young larvæ ate readily of the interior, and in doing this showed a trait not noticed before in the genus. Instead of eating the edges of the folded leaves I had flayed up for that purpose, they bored into the centre of the buds, as often beginning on the outside scales as where there were cut places, and this they continued to do till the leaves had begun to expand. When the larvæ were two inches long the leaves of *Quercus coccinea* were only one inch long. I had before found larvæ of this species in the woods of this size, when the leaves were no further developed, and could not understand why they should be nearly ready to pupate when the leaves were only just coming out, but this trait explains it. They hatch during the first warm days of spring, when the buds begin to swell, and play the part of borers in these buds till the leaves are sufficiently expanded to enable them to eat from the edges of the leaves.

CETHERONIA REGALIS, Hubner.

BY FREDERICK CLARKSON, NEW YORK CITY.

On the 22nd of August, 1882, while entomologizing along the border of a wood at Oak Hill, New York, I was agreeably surprised by a call from a lady companion—an earnest devotee of the floral kingdom, who was but a few yards distant in the pursuit of her favorite study—that she had discovered something which she appeared to regard with that sort of honor which one might bestow on a venemous reptile. Knowing her dislike of all crawling things, I at once conjectured that the cause of the alarm was a spinous caterpillar, and that my attention, no, doubt, was being directed to that over which I at least would be enthusiastic. It proved to be the formidable looking larva of this moth, popularly known as the Hickory Horned Devil, and on account of its rarity, a goodly, and in no sense an evil sight to a naturalist. It was found feeding on the hickory. It burrowed a few inches into the earth on the 19th of Sep-

tember, to transform, and two days thereafter the pupa worked itself to the surface. The moth, which proved to be a ♂, appeared May 25th. On the 29th of August I found my second larva of this moth; it was full fed and conslderably larger at the time of pupation than the previous capture. It burrowed into the earth the same day, and a short time thereafter the pupa wriggled itself to the surface, the imago ♀, appearing on the 23rd of May. My third larva of this moth was received by post, September 1st last, from a friend at Clermont, New York, who informed me that it was found by his gardener, and was thought to be a great rarity, as that important functionary had declared that he had never seen the *like* before. Strange that so ponderous a caterpillar should have escaped the gardener's more ponderous foot! Luckily it was not thought to be a snake, or for the love of St. Patrick he would have counted it among his squashes. It burrowed into the earth on the 6th of September, and in a few days the pupa appeared upon the surface. It would seem from these facts that it matters not at what time the larva pupates, the imago appears at the end of May. It is also made evident that the pupa remains upon the surface of the ground during the winter.

CORRESPONDENCE.

ON THE BREEDING OF LEPIDOPTERA.

On the 5th of December, 1883, I took from a room which had not yet been warmed up, this winter, a number of pupæ (Heterocera) of different species. These I took to a room having a warmth of from 64–80 degrees Fahr. (16–20 Reaumur), to ascertain the amount of warmth the different species of Lepidoptera need to reach the imago state, with the following success. On January 16th, '84, the first imago disclosed a fine specimen of *Hemaris tenuis*. On January 27th, another *H. tenuis* hatched in good condition; also a *Telea polyphemus*, and on February 4th a large female of *Apatela lepusculina* also disclosed. I have yet a number of pupæ exposed to the same warmth, and will report of further success.

A NOTE ON VANESSA (AGLAIS) MILBERTI.

In September, 1883, on a Thursday, I took a number of caterpillars of *Vanessa Milberti* on the common nettle, which were full grown. On

the morning following three were suspended and the same day pupated. On Tuesday next, when putting fresh food in the box for the few which had not yet pupated, I was astonished to see an imago of *V. Milbertii* in the box, and on examining I found the empty pupa case suspended on one side of the box. From that day they gradually hatched, until two weeks after I found the caterpillars quite a number of imagoes had disclosed; the balance I found, after waiting another week, to have died in the pupa state. What do you think has been the cause of such a hurry?

WILLOW AND POPLAR, ALSO FOOD PLANTS OF PAEONIAS (SMERINTHUS) EXCÆCATA.

Last fall (1883) I found the larvæ of a Sphinx quite abundant on willow, which were uniq[illegible] in color and markings, with the caterpillar of *P. excæcata*. Reaching home I put them on the same kind of plant in my garden. I then also took some caterpillars of *P. excæcata*, which I had found feeding on [illegible]len, and tied them in a gauze bag on a willow branch, on which they readily fed and afterwards pupated, this assuring me that the first mentioned were of the same species. Early in August I also found a number of small caterpillars of the same species on poplar *(P. monolifera?)*, which I also fed on willow and on linden. The caterpillars of *P. excæcata* have been very abundant here last season, on willow, whilst *Sm. geminatus*, which I have not yet noticed on any other plant, has been very scarce.

In Vol. iv., No. 2, p. 62 of the Bulletin of the Society of Natural Science, Buffalo, N. Y., I stated in an article never to have caught the imago of *Darapsa myron* on strings of dried apples, soaked in stale beer and sugar; this I wish with this to recall, as I caught a specimen on it last season. *D. versicolor* and *D. choerilus* especially come frequently, and have been taken by me quite often.

PH. FISCHER, 528 High St., Buffalo.

Dear Sir,—Mr. John D. Evans, on page 237, describes an unusual gathering of Coleoptera on the shore of Weller's Bay, and desires to know if others have observed similar instances. On 3rd June last, I saw an almost equally numerous collection of insects near this city, between the Chaudiere Falls and the Canada Pacific Railway bridge across the Ottawa. A long boom-log fixed almost at right angles to the shore, formed with it a pocket into which were swept by the swift current chips, bark and other

small drift-wood. The accumulation was literally swarming with insects which had evidently fallen, or been blown, into the river, and had sought safety upon the drift-wood floating with them. Having floated into a haven of refuge, they were crawling upon the most elevated places and drying themselves in the sun preparatory to flight. In many instances, however, they were doomed to disappointment, as sudden changes in the current and eddy would every now and then violently agitate the accumulation, wash off many of the insects, and send portions of the drift-wood again into the current to be carried further down. Beetles were most numerous, but there were also large numbers of Diptera and some Hymenoptera and Hemiptera. The Coleoptera were principally comprised of Chrysomelidæ, Coccinellidæ, Histeridæ, Nitidulidæ, Lampyridæ and Staphylinidæ, and were generally the smaller and commoner species.

Ottawa, 18th Feb'y, 1884. W. Hague Harrington.

THE DUNG PELLET MAKERS.

BY FREDERICK CLARKSON, NEW YORK CITY.

The term Scarabaeus, as applied by the ancients to the Sacred Beetle of Egypt, and afterwards by Linnaeus as comprehending the great division of the Lamellicornes of Latreille, is derived from Khepra, an African word, which means cipher or circle, and has reference to the orbicular shape of the pellet of dung that contains the deposit of ova. Khepr is no doubt the root word, and is analagous with the Greek word Kapobos, the Latin word Scarabaeus, and the English word Crab. Any ordinary scholar can follow the slight linguistic change that produces one from the other. The Scarabaeus is imaged amongst the hieroglyphics of the Egyptians, and was regarded by those ancient people as a symbol of the world and the sun. It is not improbable that the term Scarabaeus is associated in the minds of the many with the idea of a Crab, not only because the Sacred Beetle of Egypt is represented under that form, as a sign in the zodiac, but also from the peculiar conformation of the clypeus and thorax of the beetle to the shell-case of that Crustacean. Scarabaeus evidently means a ball. It seems to the writer that we apply this term to cover a larger class of beetles than the signification of the word will admit.

This article, however, is not intended to suggest any limitation in the classification, but merely to ascribe to these indefatigable laborers the designation which they have earned in the very infancy of human observation.

BOOK NOTICES.

Bulletin of the United States National Museum, No. 22. Guide to the Flora of Washington and vicinity. By Lester F. Ward; 8vo., pp. 264.

This is the twenty-sixth of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum at Washington. In the introductory remarks which precede the list proper, the author gives a great deal of useful general information relating to the Flora of Washington and vicinity. In the list the common as well as botanical names of the plants are given, with dates of flowering and localities for the rarer species. This general list is followed by a check list, including 1,384 species. The report closes with an instructive appendix in which many useful suggestions are given to beginners in the study of botany.

Proceedings of the American Society of Microscopists; 6th meeting held in Chicago, August, 1883; 8vo., pp. 275.

We have been favored by the Secretary, Dr. Kellicott, of Buffalo, with a copy of the above work, which contains a number of very interesting papers on natural history and other subjects. So energetic an organization as the American Society of Microscopists cannot fail to greatly stimulate microscopic research in all directions in this country. The volume referred to gives abundant evidence of the good work being accomplished.

The Number of Segments in the Head of Winged Insects. By Dr. A. S. Packard.

We are indebted to the author for a copy of this paper, recently published in the *American Naturalist*.

A Revision of the Lysiopetalidæ, a Family of *Chilognath Myriopoda*. By Dr. A. S. Packard.

In studying the cave fauna of the United States, the author of this paper found it necessary to work carefully over the structure of the Myriopoda. In this paper he gives a systematic account of the genera and species pertaining to this group, describing also the characters of a new genus, *Cryptotrichus*, followed by a chapter on the Morphology of the Myriopoda, with a plate illustrating the mouth parts.

The North American Species of Conops; by S. W. Williston. From the Transactions of the Conn. Academy; 8vo., 18 pp.

In this paper the American genera included in the Conopidæ are tabulated, also the described species belonging to the genus Conops. Following these tables are descriptions of six new species.

Cold-blooded Vertebrates and Lepidoptera of Wisconsin; by Dr. P. R. Hoy. From the Report of the Geological Survey, lge. 8vo., 30 pp.

Our thanks are due the author for the above paper, containing a very full list of Wisconsin Lepidoptera, followed by one of Reptiles and Fishes.

Human Parasites; by Dr. F. W. Goding. From the Chicago Medical Journal and Examiner for Dec'r, 1883.

In this paper the author notices all the different species of parasites known to affect the human body both internally and externally, grouping them in accordance with the latest system of classification, and briefly giving the life history of each species as far as known, adding the appropriate remedies and methods of treatment for each. The list is a formidable one and goes far to confirm the statement made by the author in his introductory remarks, that "scarcely any portion of the human body is free from parasites, and each organ and system has its own special parasites."

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., FEBRUARY, 1884. No. 2

NOTES ON SPHINGIDÆ CAPTURED AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

Lepisesia flavofasciata, Barnst.—Very rare, taken in the hottest part of the day, on lilac and apple blossoms; also on *Amelanchier Canadensis*.

Hemaris diffinis, Boisd.—Common on Tartarian honeysuckle and lilac, in the middle of the day.

Hemaris gracilis, G. & R.—Quite rare, found on the same flowers and at the same time as *H. diffinis*, and also flies about sunset.

Hemaris thysbe, Fabr.—Very common, flying in company with *H. diffinis*.

Amphion nessus, Cram.—Quite common in company with the last named species.

Deilephila chamœnerii, Harris.—Some seasons quite common on Tartarian honeysuckle and lilac, at twilight.

Deilephila lineata, Fabr.—Taken on *Œnothera Lamarckiana* just after sunset, in September.

Philampelus pandorus, Hübn.—One example bred from larva on grape vine.

Philampelus achemon, Drury.—Larvæ found on grape vine, but failed to emerge.

Everyx chœrilus, Cram.—Rare, at sugar, in July.

Smerinthus geminatus, Say.—Quite common at light, in June.

Smerinthus cerisyi, Kirby.—Very rare, at light, last of May.

Paonias excœcatus, A. & S.—Quite rare, at light, in June.

Calasymbolus myops, A. & S.—Two examples taken at light.

Triptogon modesta, Harr.—Rare, at light, first of July.

Ceratomia amyntor, Hübn.—Quite rare, on climbing honeysuckle.

Daremma undulosa, Walk.—Quite common, at light and on flowers in June.

Phlegethontius cingulata, Fabr.—Two examples on flowers of *Nicotiana affinis*, quite late in the evening, in the first of Sept.

Sphinx drupiferarum, A. & S.—Common at light, and on several kinds of flowers.

Sphinx Kalmiæ, A. & S.—Found with *S. drupiferarum*.

Sphinx chersis, Hübn.—The most common Sphinx in this locality; taken at twilight on *Œnothera Lamarckiana* and *Nicotiana affinis;* also bred on ash; July.

Sphinx gordius, Cram.—Found on lilac and Tartarian honeysuckle, early in the evening.

Sphinx luscitiosa, Clem.—Rare, on climbing honeysuckle, at twilight.

Dolba hylæus, Drury.—Rare, on Œnothera and honeysuckle, at twilight.

Ellema Harrisii, Clem.—Rare, on honeysuckle, at twilight; also at light, in June.

ABNORMAL SPECIMEN OF THE GENUS SAMIA.

BY W. F. KIRBY, LONDON, ENG.

This remarkable specimen, which has puzzled every entomologist who has seen it, was bred by M. Alfred Wailly from a cocoon received from some part of North America. It may be a hybrid between *S. cecropia* and some other species, but if so, it is so different from all the other known species, that it is difficult to guess with what it could have been crossed. It is equally difficult to imagine that it is a new species. The specimen is a female, and equals the largest specimens of *S. cecropia* in size, measuring fully 6¾ inches in expanse; and the wings are more rounded and less oblique than in *cecropia*. The body resembles that of *cecropia*, except that the abdomen is banded with yellowish gray and black. The base of the fore wings is brown, thickly scaled with white towards the costa; below this is a brick-red blotch, longer and narrower than in *cecropia*. Beyond this is a white space, extending nearly from the base to one third of the length of the wing on the inner margin, but curving up to the costa in a rather narrow stripe. This is followed by a large irregular black blotch, broad at the costa (where it is thickly dusted with gray) and the narrow end extending to beyond the middle of the wing. On this stands the large white kidney-shaped central spot, which is surrounded with red, and divided by a reddish stripe at the outer end of the black blotch; it extends beyond it into a broad red white-dusted band, followed by a black one, so very thickly dusted with yellowish gray that it appears of that

color. This is succeeded by a gray space, divided by a black line (much less indented than in *cecropia)* into darker and lighter; above is a lilac space; on the inside is a row of rather large spots, the uppermost and the 4th and 5th being the largest. Hind wings white at the base, followed by a broad dark slate-colored space, on the outer half of which stands a large oval white spot, slightly surrounded with red, the outer part being incomplete, and it rests on a white band, much broader than in *cecropia*, followed by a broad red band, 3 or 4 times as broad as in *cecropia*, but followed outside by similar markings, only paler. The under surface differs from *cecropia* chiefly in the much paler color, and in the different position of the central spots.

[Mr. Kirby has kindly sent us a beautiful colored plate, prepared by Mr. Wailly, of this very interesting insect.—Ed. C. E.]

NOTES ON A VARIETY OF ANTHEREA (TELEA) POLYPHEMUS.

BY ADOLPH CONRADI, BETHLEHEM, PA.

During the early part of last spring I obtained from a small maple tree three cocoons of *Anth. polyphemus*. In due time two fine females made their appearance, and a few days later, on examining the box again, I found suspended from the lid (wire gauze) a black looking specimen, which at first sight appeared to be a ♂ *promethea*. On closer inspection, however, I found it to be a beautiful aberration of *Anth. polyphemus* ♂. As it is the first one I ever found or heard of during nearly twenty years' collecting, I send you herewith a meagre description, which may be the means of bringing another specimen like it to the notice of the entomological world.

Antherea (Telea) polyphemus, L., var. ♂.

Antennæ very dark brown. Thorax and body a shade darker. Ground color of primaries same color. Upper margin gray with minute white spots. A white band running near outer margin from the base to tip of wing, terminating in a black oblong spot, surrounded by an irregular white narrow band. In the centre of primaries another very dark line running from upper to lower margin. Towards the inner margin an irregular white line, shaded with black. Near the centre there is an ocellate, transparent

spot, bordered with a double ring of ochre and blue. Secondaries, ground color same as primaries, with a narrow marginal white band bordered with blue. In centre there is an ocellate transparent spot bordered with ochre, shaded towards the inner margin with a blue spot, the whole surrounded by a black band terminating in a white line towards the inner base. Raised from the cocoon taken in spring of 1883.

SPINNING CATERPILLARS.

BY FREDERICK CLARKSON, NEW YORK CITY.

Milton, when he wrote of Nature's bounty, and referred to the

. . . . "Millions of spinning worms
That in their green shops weave the smooth-hair'd silk,"

had thoughts no doubt of the obedience due from Nature's subjects to Nature's King. A work ordered and a work performed. Were men as loyal to their King, what a garment of righteousness would each man weave wherein to appear, amid the flood-light at the Court on high! The caterpillar, at the sighing of the autumnal wind, enfolds itself in its silken shroud, preparatory to a winged flight, leaving to the world the record of a life well spent—an unbroken thread of duty done: a treasury of silk to deck the sons of men

"In courts, in feasts, and high solemnities."

To grace man's outer life, and if in proper mood and contemplation, his inner life as well; for Nature's lessons are not learned under their external forms, but under the spiritual beauty and verities they represent.

"That not a natural flower can grow on earth
Without a flower upon the spiritual side,
Substantial, archetypal, all aglow
With blossoming causes—not so far away
That we, whose spirit-sense is somewhat cleared,
May not catch something of the bloom and breath."

Nature has many voices. She speaks to us in joyful song amid the activities of the day, and in saddening dirges during the still hours of the night, while throughout her wide domain, in song of life and dirge of death, she whispers Resurrection.

Among the multifarious forms of insect-architecture, all of which are of absorbing interest, I purpose at this time to record a few notes relating

to the cocoons of the Bombycidæ. The cocoon made by the Worm of the Orient has, from the circumstance that its silk is so extensively used in manufacture, been fully described. This paper concerns those of the Polyphemus, Cecropia, Cynthia, Luna and Promethea caterpillars, and it may be regarded as an endeavor to foster an organized system of silk culture with these worms, the Cynthia worm especially favoring cultivation, as it is double brooded, and since its introduction from the East, together with its food plant, the Ailanthus, it has become largely distributed throughout the country. The habitat of some of these species is co-extensive with the Union, and silk culturers are alike advantaged in every section of the country with an abundance of food plant in our native trees. The silk produced by them, though not of as fine a texture as that spun by the Mori Worm, is yet abundant and of much greater strength. Notwithstanding the fact that the pointed end of the cocoons of the Cecropia, Cynthia and Promethea worms is left open for the exit of the moth, the threads are unbroken and the cocoons can be unwound. The Mori Worm covers the interior lining of the cocoon with a gummy secretion, and when the moth escapes, the threads, if not broken, are thought to be in such danger that cultivators of silk destroy the pupa before the period of emergence. There are Entomologists, however, who deny that the threads are broken at all, for they admit having succeeded in unwinding cocoons from which the moths have escaped. The Cecropia, Cynthia and Promethea worms line each layer of silk, as well as the interior of the cocoon, with a gummy secretion, leaving the silk at the exit opening free of agglutinating properties. This allows of a ready escape of the imago without danger to the thread. If the cocoons of these worms be divided lengthwise, and immersed in boiling water for a few seconds, a careful manipulation will permit the separation of the several layers of silk, when, by the aid of a lens, the life work of the caterpillar is beautifully presented and the continuity of the thread can be discovered. The exterior section of the cocoons of the Cecropia and Cynthia worms can be easily divided into three layers of silk, while the interior portion is divisible into six. The Luna and Polyphemus worms construct cocoons somewhat similar to the Mori Worm, and as all parts of the interior lining are sealed, it becomes prudent, perhaps necessary, to destroy the pupa.

NOTES ON THE LARVA OF PANTOGRAPHA LIMATA, Grote.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

On the 27th of September, 1882, while riding through Mt. Hope Cemetery, near Bangor, the leaves on several trees of Basswood *(Tilia Americana)* were observed to be rolled in a peculiar manner, and to contain a green larva with a black head, which I supposed at the time to be that of some Tortricid; but it quite puzzled me, as it was larger than the larva of any Tortricid in this region with which I was familiar. Miss Murtfeldt, who was riding with me at the time, said that she had seen the leaves of Basswood attacked and rolled in precisely the same manner in Minneapolis, but failed to secure any of the larvæ.

A large number of the rolled leaves were obtained and brought home from Mt. Hope, but the larger part of the larvæ had been destroyed by parasites or had escaped from their domiciles. Miss Murtfeldt took home with her a part of those remaining, but they failed to emerge. Of those which I retained, three pupated, one Oct. 10th, and the others a little later. They were kept in a warm room, so that without doubt the results are not the same as would have taken place out of doors. The one which went into the pupa state Oct. 10th, emerged Nov. 3rd, and proved to be *Pantographa limata* Gr. A few days later another emerged, but was crippled. The third failed to emerge either then or the following summer.

I have little doubt that if left to themselves they would have changed to pupæ among the leaves on the ground, and remained in this state during the winter, emerging the next season; for no thoughtful insect would emerge in such cold weather as we usually have here in November, but the facts must be learned hereafter.

The larva cuts the leaf across from near the middle of the side, past the midrib nearly an inch, in the larger leaves. This cut, which is about an eighth of an inch wide, first starts directly across the leaf, then curves gradually towards the apex, then back to the former direction, so that the entire cut is nearly in the form of the letter S, somewhat straightened out. The part beyond the cut is rolled over so as to form a cone with the apex towards the base of the leaf, and when enclosing a larva, both ends are turned in, so as to close the openings. In drawing the parts of the leaf together, the larva spins the thread from side to side—from the side of the cone to the surface of the leaf beyond, about forty times in a place before moving to another. The second set of threads, which is from a fourth to

a half an inch from the last, frequently draws the parts of the leaf together so much that the threads of other bundles hang in a loop. The larva deposits its excrement within the cone, towards the larger end.

The full grown larva is 25 mm. long, when at rest, and 30 when in motion; fusiform and somewhat stout in proportion to the length.

The body is pea green, about the color of the under side of the leaves of Basswood. The usual warts are present, of a dull brownish color and emitting pale hairs. The head, thoracic shield and legs are pitchy black, while the mouth parts are a little lighter, and there is a small black spot on each side of the first segment back of the head, just in front of the spiracle. The anal plate is dull brownish.

When preparing to change to the pupa state, the larva draws a portion of a leaf around it, lining it with silk, thus forming a delicate cocoon.

Three species only are at present known in the Pyralid genus *Pantographa*. The first two, *scripturalis*, of Brazil, and *anastomosalis*, of Java, were described by Guenee under the genus *Pionea*, the second one with doubt, and there was even doubt as to the locality. When Lederer made his revision of the *Pyralidæ* of the world, he established the genus *Pantographa* for these two species. Later, Mr. Grote described the species *limata* from North America, and I must confess that it is wonderfully near the Brazilian *scripturalis*, and may eventually prove to be the same species.

While the imago of *Pantographa limata* Gr. is a typical Pyralid, the larva is so very much like Tortricid larvæ, both in structure and habits, that I unhesitatingly referred it to the *Tortricidæ* till it emerged, and I could discover what it really was.

WEEVIL VERSUS CURCULIO.

BY W. L. DEVEREAUX, CLYDE, N. Y.

Curculio is an ancient Roman word, not at all used to denote a plum insect. It is slightly difficult to pronounce, and it certainly fails to inform the popular mind as clearly as the suggestive old Anglo-Saxon word, "weevil."

Weevil, in its original and right use, designates only insects of the snout-beetle kinds, like the plum weevil, bean and pea weevils, corn or

granary weevil, rice, pine, nut, water, and other weevils. Perhaps the only erroneous use of weevil made in this country was with the little yellow maggot of the wheat fly.

Entomologists most often write *plum weevil*, and pomologists use *curculio*, which is the name generally used by farmers and others. Evidently this name was adopted from its scientific generic title, as then known in the early part of this century, but almost before its adoption into common parlance, it was removed from scientific nomenclature. Had it not been introduced then, it would hardly be found in the English vocabulary now. It is in use nowhere else at the present time, being an obsolete technical word, known only in the books of the earlier writers on insects; and in its original use by Pliny and the Latins, over 1800 years ago, it was applied to the corn worm, which by the English was called *weevil*, and by the French *calendre*, since Latinized into *Calandra* by Clairville for the name of a genus, containing our corn and rice weevils.

The word *curculio* reached its greatest ascendancy when Linnæus, 120 years ago, transferred the name from the Romans into his natural system, employing it in a generic sense to designate all snout beetles.

Westwood,* in 1839, states that "In this tribe of insects, as elsewhere, from the multiplicity of named groups into which the old Linnæan genus has been separated, without the adoption of any principle regulating the retention of the old generic name, it has been entirely sunk, so that we find no modern genus *Curculio*."

It has, however, been retained by some classifiers for a few beetles, not including the plum weevil, until now, while all writers employ a family name, *Curculionidæ*.

The plum weevil was first described by Herbst, in 1797, under the name *Curculio nenuphar*. The specific name *nenuphar* is the French name for the great European water lily *(Nymphæa alba)*.

About 1830, Schonherr erected the genus *Conotrachelus*, meaning conical thorax or throat. At the abandonment of the name *Curculio*, our plum weevil fell into this genus, and hence is known as *Conotrachelus nenuphar*, Herbst.

There are about thirty species of *Conotrachelii* in N. America, all agreeing in structure quite closely with the plum *Conotrachelus*. The

* Westwood, Introduc. Mod. Classif. Insects, 1., p. 348.

butternut weevil appears so closely like it that it has often been pronounced a large plum weevil.

No other member of this genus has been found attacking as many fruits as this plum weevil. Most species confine their depredations to a single kind of plant, like the quince weevil, *Conotrachelus cratægi*, which deposits its eggs in that fruit. The plum weevil is, however, a general fruit weevil, attacking, with only an occasional marked preference, every species of fruit in the botanical genera, *Prunus*, *Pyrus*, *Cydonia*, and some other species in other genera of the Rose family; and Miss M. E. Murtfeldt states* that she has bred them from gooseberries. In this connection it is singular that the grape has not suffered from its crescent thrust. Finally, from its habit of breeding in the "black knot" of the plum, it must be considered the most omnivorous of all the 1050 species of weevils now known in N. America.

LIFE HISTORIES OF FIVE SPECIES OF SCOPELOSOMA.

BY ROLAND THAXTER, KITTERY POINT, MAINE.

During the spring of the past year I was fortunate enough to procure eggs of the following species of *Scopelosoma*, and succeeded in rearing a sufficient number of each to ensure an accurate observation of their larval differences. The matter is of some interest, as it settles beyond question the specific difference between the two species known in collections as *S. Walkeri* and *S. vinulenta*, which have been enumerated as varieties of the mythical *sidus* in recent lists. That one of these species is really *sidus* I think there can be little doubt; but which should be referred to it is somewhat uncertain.

My friend, Mr. Chatfield, has had the kindness to send me for comparison with my own material, a specimen of a *Scopelosoma* taken by him at Albany, which, he informs me, has been pronounced by Mr. Grote to be with little doubt "a veritable *sidus*." On comparing my material of *Walkeri* (determined thus by Mr. Grote) with this specimen, I find no essential differences between the two, Mr. Chatfield's specimen being somewhat more clearly marked and darker than usual, and most decidedly not "d'un rouge de brique * uni, avec les lignes a peine distinctes."

* Rept. Entomologist U. S., C. V. Riley, 1881–1882, p. 66.

If Mr. Grote is correct in referring this specimen to *sidus*, we must consider *Walkeri* as a synonym. A comparison of *Walkeri* and *vinulenta* with the European *satellitia* and Guenée's description of *sidus*, leads me, however, to think that the latter species may be more properly identified with *vinulenta* than with *Walkeri*, for in *vinulenta* only are the primaries noticeably broader and shorter and more rounded at the apex than in *satellitia;* and the even brick-red color is very characteristic of *vinulenta*, while *Walkeri* has a decidedly purple cast, blackish in Mr. Chatfield's specimen, with the lines much more distinct. For these reasons I feel very decidedly inclined to consider *vinulenta* = *sidus*, although I retain the old name in speaking of this species in the following descriptions.

The larvæ of these five species all have the same form and habit; are omnivorous, and live in a case between two leaves, or within the fold of a single leaf—when young making a silk-covered burrow between two ribs or eating out a cavity in a bud somewhat after the manner of a Tortricid. When fully matured and somewhat soiled, it is hardly possible to separate the species. *Devia* and *vinulenta* are very nearly related in this (the larval) stage, and separable at a glance from the others, when in good condition. *Tristigmata* is readily separable from the two remaining species by the yellow tinge of the lateral line, which I found characteristic of all, without exception, of a very large series of specimens. *Morrisoni* and *Walkeri* are the most difficult to separate, but the more even and richer color of the sub-dorsal and dorsal regions, together with the obliteration of the dorsal and sub-dorsal lines and the clear white lateral line, render the latter species sufficiently recognizable when fresh. The lateral lines are substigmatal, the stigmata black, the body sparsely covered with minute tubercles bearing short colorless hairs in all the species. Form cylindrical, tapering very slightly, head moderate.

Scopelosoma Morrisoni, Grote.

Eggs laid on oak twigs April 22. Straw color changing to reddish; flattened inferiorly, a central superior depression from which radiate beaded ridges. Transverse diameter about .6 m m. Hatched May 4.

First Stage.—When just hatched, color livid yellowish green with blackish superior and anterior tinges. Head large, jet black. Legs and prolegs black. A frontal semi-circular black plate on seg. 1. After feeding and when nearly grown, indications of a dorsal, sub-dorsal and lateral streak. Color light green, darker superiorly. L. 2–3 m m.

Second stage May 15. Above dull purplish, darker in the subdorsal region, with a greenish tinge. Dull yellowish inferiorly, except on segments 1–4, which are tinged with purplish. A dorsal, two sub-dorsal and a sub-stigmatal whitish line, the two sub-dorsal ones less clearly marked, especially the inferior. Setiferous tubercles, which bear short colorless minute hairs, blackish, indistinctly ringed. A few whitish mottlings between the longitudinal lines. Stigmata blackish, indistinctly ringed. Legs and prolegs black. L. 6 m m.

Third stage May 22. Much as before; the markings more distinct, especially the dorsal and lateral lines. Purple shades most prominent in region of stigmata. L. 10 m m.

Fourth stage May 28. Color above and below on segments 1–3 dull purple tinged with green dorsally. Below light greenish; a patch of purplish in the sub-stigmatal region of each segment. Dorsal line with a bluish tinge. Head light brown. L. 16 m m.

Fifth stage June 2. Marked as before, but less distinctly. Colors duller and darker. L. 25 m m.

Sixth stage June 8. Mature larva. Dull blackish with a slight bluish green tinge and lateral dull purplish shades, obscurely mottled. Dorsal streak indistinct, bluish white, somewhat irregular. Sub-dorsal lines broken, but tolerably distinct, the superior edged with blackish. Lateral streak white with a bluish tinge. Stigmata black. Setiferous tubercles minute, black, ringed with bluish white; those below the lateral line more distinct. The superior sub-dorsal line cuts the frontal plate of segment 1 very clearly, and is there tinged with yellowish. Rather stout, slightly tapering. L. 35 m m.

Scopelosoma Walkeri Grote.

Eggs as in *Morrisoni*. Laid April 25; hatched May 6.

First stage May 6. Not separable from *Morrisoni*.

Second stage May 16. Not separable from *Morrisoni*.

Third stage May 23. Somewhat darker than *Morrisoni*, and more distinctly purplish. Head much darker and inferior sub-lateral line less distinct. But varies so as to be hardly separable.

Fourth stage May 29. Somewhat darker and less distinctly marked than *Morrisoni*.

Fifth stage June 5. Much darker than *Morrisoni* and more evenly colored, being of a rich, velvety black-purple. The sub-dorsal lines

hardly visible. The lateral line clear, contrasting white, tinged with purple on segments 2 and 3. Setiferous tubercles smaller than in *Morrisoni.*

Sixth stage June 10. Mature larva much darker and more richly colored than *Morrisoni.* Above velvety black with a purple shade and some greenish tinges. The dorsal and sub-dorsal lines barely indicated. Setiferous tubercles barely visible, those below the lateral line more distinct. Lateral line clear white, contrasting, somewhat obliterated on segments 2, 3, 4, 11, 12. Superior sub-dorsal line is clearly marked through frontal plate of segment 1, and is tinged with yellow. Beneath bluish green. The sub-lateral region has a few pinkish shades, as does the ventral portion of segments 1 to 4. Form somewhat stouter than *Morrisoni.* Head more broadly edged posteriorly with light brown. L. 30 m m.

Scopelosoma vinulenta Grote.

Eggs as in *Morrisoni.* Hatched May 9.

First stage May 9. A little lighter than the two preceding species, but hardly separable.

Second stage May 18. Light green with slight lateral purplish shades. Head black.

Third stage May 24. Purple shades, except on segments 1–4, confined to the region included by the lateral and superior sub-dorsal lines. The inferior sub-dorsal line hardly visible. Dorsal parts distinctly blue-green. A continuous whitish dorsal line, broader, though less well defined than in *Morrisoni* of same stage. Beneath light green. Head light brown, darker anteriorly. L. 10 m m.

Fourth stage May 30th. Much as before; the purple duller and clearly defined. Dorsal and lateral lines more distinct. Inferior sub-dorsal line merely indicated by a few whitish mottlings. Head shining brown. L. 16 m m.

Fifth stage June 6th. Darker. Dorsal parts tinged with purple. Lateral line distinct, whitish contrasting above. Beneath light bluish green with purple tinges on segments 1–4. Sub-dorsal line visible on segments 1–3. Head more red brown L. 25 m m.

Sixth stage June 13. Mature larva. Dorsal portion dark olive green mottled with darker shades. Region between superior sub-dorsal and lateral lines dirty wine color, somewhat mottled. Dorsal and superior sub-dorsal lines moderately distinct. Inferior sub-dorsal line marked by a

few dots. Lateral line less distinct and suffused with purplish. Beneath livid; red-purple on segments 1–4. L. 32 m m.

Scopelosoma tristigmata Grote.

Eggs as in *Morrisoni*, laid April 24.

First stage May 5. Not separable from *Morrisoni.*

Second stage May 16, third stage May 22. In neither separable from *Morrisoni.*

Fourth stage May 28. Colored and marked as in *Morrisoni*, but the colors decidedly brighter and the lines and setiferous tubercles more distinct. L. 15 m m.

Fifth stage June 3. Somewhat lighter and more clearly marked than *Morrisoni.* The setiferous tubercles of dorsum decidedly larger, affording a reliable character for separation in this stage. L. 25 m m.

Sixth stage June 8. Mature larva. Much like *Morrisoni* and readily mistaken for it, but differing in the richer color, the more indistinct dorsal and sub-dorsal lines; but especially by the lateral line, which is broader posteriorly, and differs in every instance by a distinct orange-yellow tinge, which, though not particularly noticeable, is never present in *Morrisoni.* Moreover, the superior sub-dorsal line does not extend to the head, and is much less distinct. L. 30–35 m m.

Scopelosoma devia, Grote.

Eggs as in *Morrisoni.*

First stage. Milky white. Head, legs, prolegs and anterior plate of segment 1, black. L. 2 m m.

Second stage. Milky white, clearer than before. Setiferous tubercles black. A faint purplish lateral and dorsal tinge.

Third stage. Much as in the same stage of *vinulenta*, though paler.

Fourth stage. Paler than any of the preceding species, but nearest to *vinulenta*, from which it differs by a tolerably distinct sub-dorsal line, and by the absence of any purple shades on segs. 1-3, except above the lateral line, which is white. Dorsum light bluish green, mottled with whitish. Beneath very light colored. Prolegs black. Head black anteriorly, brown posteriorly.

Fifth stage June 10. Very near *vinulenta*, but much paler. Above greenish white, with a bluish tinge and darker olive shades. Dorsal and superior sub-dorsal lines distinct, contrasting with their edging of dark olive. The region between the superior sub-dorsal and lateral lines is

dark dull olive green, tinged with purple; darker inferiorly, with a few white dots. Lateral line broader than in *vinulenta*, but less clear. Purple tinges at base of prolegs, which are black. Head much lighter than *vinulenta*, black anteriorly.

Sixth stage June 15. Nearest *vinulenta*, but a darker or blacker looking larva. A broad dorsal blackish band attenuated intersegmentally, and including the hardly visible median dorsal streak, which terminates in an oblong spot on anal segment. The remainder of dorsal surface is mottled greenish, gray and blackish. Superior sub-dorsal line broadly edged with black; but inconspicuous, except on first and last segments. Lateral line broad, more or less clearly defined, whitish, with blackish shades. Beneath light greenish. Else as in preceding stage. L. 30 m m.

The larvæ of all these species entered the earth during the second and third weeks of June, spinning a slight cocoon, in which they remained without changing until August, the imagoes appearing during the first week of September. The pupa is light yellow brown, rather short and stout. The larvæ of *devia* were more delicate than the others, and only a few were brought to maturity and inflated, so that no imagoes were obtained.

Although *Morrisoni* and *vinulenta* are such abundant species in most localities, I have but once found the larva of any *Scopelosoma* when collecting, and I now recognize this to have been *vinulenta*, which was feeding on *Azalea viscosa*.

It will now be of interest to breed the four remaining species of this genus, which are of a somewhat different type, and especially *Moffatiana* and *Græfiana*. It is a question which can only be decided by careful breeding whether these two are identical, as some Entomologists suppose. For my own part I am still inclined to think them distinct, as I have found no difficulty in separating the two species in a large series of specimens, although breeding from the egg may show them to be varietal forms.

I may add that any one intending to rear larvæ of this genus will do well to keep the imagoes frozen on ice until spring is far enough advanced to furnish tolerably mature leaves, since handling the young larvæ among small, sticky, immature leaves and buds is a most tedious operation, which is rendered still more difficult by the habit of concealment peculiar to these larvæ.

NOTES ON A FEW SPECIES OF COLEOPTERA WHICH ARE CONFUSED IN MANY COLLECTIONS, AND ON SOME INTRODUCED EUROPEAN SPECIES.

BY JOHN HAMILTON, ALLEGHENY, PA.

In exchanging Coleoptera it is common to find many erroneous determinations of species. While these errors are for the most part individual, several are wide spread and seem to be perpetuated by tradition from the older collections. The object of this paper principally is to direct attention to a few of the latter.

1. *Triplax thoracica* Say, and *T. flavicollis* Lac. These species are often found in colonies feeding together on the same fungus, and have the same appearance. The separation of mature specimens is easy, the under side of *thoracica* being entirely rufous, while the metathorax and abdomen of *flavicollis* are black or piceous.

2. *Brachyacantha indubitabilis* Crotch. Several exchange lists contained this species; but when it came to hand, in every instance it proved to be *Hyperaspis signata* Oliv., which is of a similar size and appearance. Apart from generic characters, *indubitabilis* is more convex and the elytra are not compressed at the sides. The elytral yellow spot is noticeably nearer the base, and there is a smaller one near the apex, which is wanting in *signata*. The latter is widely distributed, while Illinois is given as the *habitat* of the other.

3. *Epierus pulicarius* Er. The insect usually sent by this name is the common *Hister subrotundus* Say. A glance at the head is instantly decisive. In the former the front is convex; in the latter, broadly concave; otherwise there is great similarity.

4. *Anomala minuta* Burm. This I have never seen, nor yet a description of it. All the specimens reeeived in exchange so named have proved to be the black form of *varians*.

5. *Dromæolus striatus* Lec. I have not yet succeeded in obtaining this from any of the lists. There was sent to me twice *cylindricollis* Say, and six times *Nematodes penetrans* Lec. The species of the genus *Nematodes* should be of easy recognition, as in all of them the last abdominal segment ends in a spine, and on the thorax there are two, or four, deeply indented impressions or punctures.

6. *Calopteron reticulatum* Fab., and *typicum* Newm. Collectors seem

to think these names represent two species. Those having *reticulatum* are always endeavoring to obtain *typicum;* while those having the latter are always seeking for the former, without either of them succeeding satisfactorily. The literature of the subject is, perhaps, answerable for the confusion. The catalogue of the species of *Calopteron* (by Crotch) is now erroneous and obsolete. Dr. Leconte, in his recent Synopsis (Trans. Am. Ent. Soc., vol. 9, p. 63), corrects certain errors that occurred in his former Synopsis (Jour. Acad. Nat. Sci., ser. 2, vol. 1, p. 74). He now makes *terminale* Say a species, and places *typicum* Newm. as a synonym of *reticulatum* Fab., referring to these two names all the forms now known east of the Rocky Mountains, regardless of the color of the thorax and elytra—to *reticulatum*, those having two elevated elytral costæ; and to *terminale*, those with four. By reference to the foot note *(ib.* p. 63) it will be seen that two unfortunate errors occur in the text at page 20, which, if not observed, would lead to great confusion.

7. *Euderces pini* Oliv. Five times this has appeared on the lists of some of the more accurate of my correspondents, and as many times, instead, have I been sent *Psenocerus supernotatus* Say. I could scarcely account for this, and for the great demand for so common and so widely distributed an insect as *P. supernotatus*, till an appeal for the correctness of the determination *pini* was made to the Journal of the Acad. Nat. Sci., ser. 2, v. 2, p. 158, the writer stating that Dr. Leconte had several years ago so named his insect. Reference to the place cited shows that Dr. Leconte then regarded the *Callidium pini* Oliv. and the *Clytus supernotatus* Say as one species, which he placed in the genus *Psenocerus*. Subsequent investigation proved that *pini* (which had been unknown in nature to Dr. Leconte) was different from *supernotatus*, both as to species and genus. The error was corrected in the books, but it has given rise to a great mistake in the tradition of the insect. I have not yet seen *pini*, but from the description of Dr. Leconte (Smithsonian Misc. Coll. 1873, vol. xi., p. 202), it certainly resembles *P. supernotatus*. To distinguish them at a glance, it is only necessary to remember that the thorax of the former, instead of being pitted, is longitudinally rugose, and that there is on the elytra anterior to the middle a smooth, ivory white, obliquely transverse line which is wanting on the latter. *E. pini* seems rare. *P. supernotatus* is one of the few Cerambycids that occasionally hybernate. In February of the present year, I found three in the folds of a Cecropia cocoon taken from some currant bushes.

8. *Dermestes Frischii* Kugel. No notice of this species as having been found in our Fauna has been observed. It occurs in great abundance on the Atlantic coast at Brigantine, N. J., on sand-hills among fish refuse from the hotels. Till recently I regarded it as a variety of *vulpinus* Lin., but the receipt of *Frischii* from Europe enabled me to correct the error. Specimens sent to Mr. C. Spiess, Switzerland, labeled *vulpinus*, were also recognized at once as *Frischii*. It belongs to the division of the genus with *vulpinus*, from which it differs in being smaller, more scaphoid in outline. and in the last abdominal segment having only the *tip and a spot on each side denuded.* The under side is densely clothed with pure snowy pubescence, except the usual row of denuded spots on each side of the abdomen, and a smaller one on the episternum of the metathorax close to the elytra. The basal half of the femora is covered with the same white pubescence, and is not annulated. The pubescence on the sides of the thorax is the same as in *vulpinus*, though the triangular black spot has sparse semi-erect grayish pubescence, like the elytra.

9. *Dermestes murinus* Linn. Mr. H. F. Jayne, in his Revision of the Dermestidæ of the U. S., Proc. Am. Phil. Soc., 20, 350, describes *murinus* Linn., placing under it as varieties *caninus* Germ., and *rattus* Lec., and making synonyms of *nubilus* Say and *dissector* Kirb. With about fifty European specimens before me, and omitting the synopsis which is not applicable to the European *murinus*, I would call the description fair, provided " cinereus " is interpreted strictly to mean *gray tinged with black;* but in that sense, it does not apply to *nubilus*, in which *fulvus* takes the place of cinereous. If considered wise to unite in one species the above named forms, it might give better results to make *nubilus* a variety also, the differences between it and *murinus* being quite as appreciable as those of *caninus* or *rattus*. *Murinus* is black—has black antennæ, the mottling is of a different pattern, and it has not on it a fulvous hair or scale, except on the scutellum. *Nubilus* is blackish brown—has rufous antennæ, and the fulvous pubescence rather predominates over the dark.

Blaps mortisaga Linn. By whose authority this has been placed on our Catalogue is unknown to me. I have three insects from West Virginia, so called ; but Mr. C. V. Riley, in a late number of the *American Naturalist*, says the Virginia species is *similis* Latr. It is greatly to be regretted that introducers of species frequently neglect to characterize them, so that when found by others they may be recognized. A name without a description is only an aggravation. In the present instance I

have Trans-Atlantic specimens of both species, and the American form differs from either of them fully as much as they do from each other. The European *mortisaga* and *similis* seem to vary much within specific limits; and had my American forms occurred in localities remote from one another, species-makers would doubtless have given each a distinct name. One has the thorax smooth, sparsely pitted, and the elytra sulco-striate; another has the former uneven with shallow depressions, and also the elytra similarly sculptured and without the faintest appearance of striation or indentation; while the third is intermediate. From the material before me I would say that the Virginia insect is as likely to be *mortisaga* as *similis*, with the chances in favor of some other of the numerous European species.

The species of *Donacia* are greatly confused, and as sixteen new species have been added since the last Revision (by Crotch), fourteen of which were described in Europe, a new synopsis accompanied by good descriptions is greatly desired. The same may be said of several other genera, especially *Brachynus*, *Bembidium*, *Heterocerus* and *Lachnosterna*, for all of which it is almost useless to exchange.

GLAUCOPTERYX CUMATILIS AND MAGNOLIATA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

CUMATILIS, G. & R.

Color of front wings greenish white, with heavy black markings; in one light the whole front wing is suffused with a rich smoky brown, whilst in another it has a beautiful green gloss deepest in the centre. Hind wings brownish gray. Two specimens.

MAGNOLIATA, Guen.

Color of front wings white with black and light gray markings. Five specimens, varying considerably from one another. Hind wings white, more or less pure.

The markings in both forms are identical, but differing greatly in depth and distinctness. In *Cumatilis* there is a sinuate line across the centre of the front wing of a buff color, quite distinct. In *Magnoliata* it is so faint as to be scarcely perceptible. *Magnoliata* has a conspicuous black

spot in the centre of the front wing, which is obscured in *Cumatilis* by its heavy black markings. I have not seen the description given with either name, but in a foot note to *Cumatilis* in his Check List, Mr. Grote remarks : " Dr. Packard calls this species Guenée's *Magnoliata ;* Guenée's descr., x., 455, calls the fore wings 'white, with black lines dividing the wing in five spaces,' with a 'thick cellular spot.' The hind wings are called 'white,' and there is no 'green' mentioned.

I think it is probable I have both forms in these specimens which I captured here last summer for the first time. I have no doubt they are one species, but so distinct in their appearance as to make the use of both names desirable and convenient ; whilst from the boldness of its markings and the superior beauty of the insect, *Cumatilis* seems naturally to claim the precedence.

KIRBY'S "INSECTA."

We are glad to be able to announce that we have reprinted from the pages of the CANADIAN ENTOMOLOGIST, the "Insects of the Northern Parts of British America," compiled by the Rev. C. J. S. Bethune, M. A., formerly the Editor of the CAN. ENT., from "Kirby's Fauna Boreali-Americana : Insecta." The volume contains some 170 pages, and will be found of great assistance to Coleopterists. The price is $1.

CORRESPONDENCE.

RARE MOTHS AT MONTREAL.

Dear Sir : Last fall an important addition was made to our list of Sphingidæ. A number of larvæ of *Philampelus achemon* were discovered on cultivated grape-vines growing in the open air, at a gentleman's residence in this city. Another western Sphinx, *Deilephila lineata*, is taken here, but very rarely. I have heard of only two specimens in ten years. Last year, a specimen of *Samia columbia* was brought to me, captured in a central part of the city. A few days afterwards I received a *Hepialus thule*, Strecker, described by him in No. 12 of his "Lepidoptera," from a specimen sent him from here by Mr. Caulfield. Mr. J. G. Jack, of

Chateauguay Basin, also has a very beautiful specimen of this moth. These three are, I believe, the only specimens in collections.

Montreal, February, 1884. G. J. BOWLES.

ENEMIES OF PIERIS MENAPIA.

Dear Sir : The determination of the Hemiptera collected in Washington Territory permits me to give the following notice. *Podiscus crocatus* Uhler (MS.) is a very eager enemy of the pupa and the caterpillar before pupating, when it is very sluggish. The *P. crocatus* was everywhere common in the devastated forests, and observed in the act of sucking caterpillars. *Neides muticus* Say was seen near Loone Lake on the freshly laid eggs ; one specimen, together with the eggs, is before me.

Cambridge, Mass., Feb. 27, 1884. H. A. HAGEN.

BOOK NOTICES.

THE GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.—The last volume issued by the Department is full of interest, and betokens much care and skill in its preparation. The maps are excellent. A new feature is a separate Catalogue of Canadian Plants, by Prof. John Macoun, the well-known Naturalist of the Survey. Part I.—Polypetalæ—is the first of this proposed publication, and it will be a source of great gratification to all our Naturalists to know that a commencement has been made in this desirable undertaking. We learn from Dr. Selwyn, the Director of the Survey, that "it is intended to enumerate systematically the plants of the Dominion of Canada, and to define their range in so far as the knowledge at present available enables this to be done. This, the first part of the Catalogue, will be followed by others as it is possible to complete the necessary examination of collections and authorities. We venture to express the hope that in due time the "Fauna" of the Dominion may be catalogued in a similar manner, and that the Natural History Survey will be carried on with energy and skill in all its branches.

THE CANADIAN RECORD OF NATURAL HISTORY AND GEOLOGY.—This magazine is published by the Natural History Society of Montreal, and takes the place of the *Canadian Naturalist*, formerly published by the Society. The *Record* will be published quarterly.—E. B. R.

(December, '83, No., mailed February 20, '84.)
(January, '84, No., mailed March 4, '84.)

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., MARCH, 1884. No. 3

TWO NEW MYRMECOPHILÆ FROM THE UNITED STATES.

BY LAWRENCE BRUNER, WEST POINT, NEBRASKA.

Before describing these interesting little crickets which have been neglected or overlooked so long in this country, it becomes necessary to enter somewhat into details. The group being one not often written upon, or the specimens often met with, they are therefore rare to collections. Prior to this account but two authentic notices of their capture in the United States have appeared, viz., the one referring to a specimen taken in Georgia by H. K. Morrison, and the other a reference to the present described species, one from the vicinity of Washington, D. C., and the other from the Pacific coast, at Portland, Oregon, the former of which is herewith figured (fig. 4), *a* representing the female, and *b* the male. This is undoubtedly the largest *Myrmecophila* known, being fully 4 m. m. in length, while the largest European species measures nearly one fourth less.

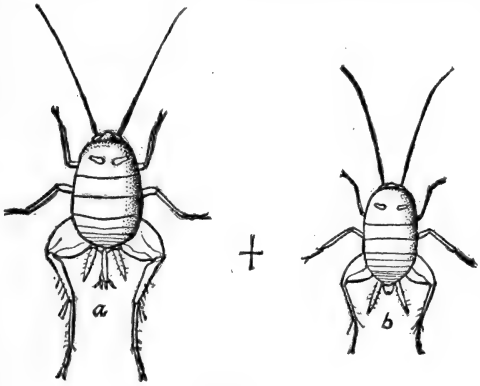


Fig. 4.

The habits of our two species, as far as known, agree well with those of the Orient. They are to be met with in the nests of various species of ants, and especially such as live in rotten stumps and logs or under stones in damp localities. Among these may be mentioned *Camponotus pennsylvanicus*, *Formica rufa*, and *Cremastogater lineolata*.

This being the first description of insects in this country belonging to the genus *Myrmecophila*, it would not be out of place here to give a short diagnosis of the genus before proceeding to the species.

Generic Characters of *Myrmecophila* :—

Body ovate, greatly convex, apterous. Occiput entirely hidden by the pronotum, vertex depressed. Eyes ocelliform. Furrows of the antennæ greatly impressed. Antennæ as long as the body, thickest at base, apex pointed. Pronotum large, wide, narrow in front, wide behind with the front and hind margins usually straight, lobes deflexed but not contracted. Meso- and meta-notum not differing from the segments of the abdomen except in some instances where they are wider. Anterior feet small, subcompressed. Anterior tibiæ without tympanæ, unarmed. Posterior femoræ greatly enlarged, dilate ovoid. Posterior tibiæ shorter than femoræ, stout, compressed, with the upper margin ciliate, internal margin with four movable spines, external margin with two spines, and with four long, terminal spurs. Abdomen short, greatly depressed, and attenuate or tapering. Cerci strong, as long as or longer than the abdomen. Ovipositor short and quite stout. The male differs from the female in its more slender form and its smaller size.

Myrmecophila Pergandei, n. sp.

General form looking from above oval, smallest at the head. The latter depressed, deeply sunken into the front margin of the pronotum. Basal joint of the antennæ very large and globular, with a few short bristle-like hairs encircling the insertion of the second joint, remaining joints gradually decreasing in size toward the apex. Antennæ as long as body, pale yellowish at base, remaining portion rufous. Eyes small, black, composed of a group of ocelli-like cells, which are situated immediately behind the base of the antennæ—in dried specimens partly concealed by the front margin of pronotum. Anterior legs small, slightly compressed, unarmed. Posterior femora greatly enlarged, compressed, ovate incrassate ; tibiæ stout, also slightly compressed, shorter than femora, and furnished with four movable spines on the inner and two on the outer edge ; apex with four long spurs. Tarsi plain. Cerci stout, acuminate, slightly thickest in middle, as long as the abdomen, quite hairy ; a trifle heaviest in the male. Ovipositor slender and larger than usual, with the valves of equal lengths, as shown in the accompanying illustration (Fig. 4, *a*).

Pronotum large, wide and greatly deflexed ; narrow in front and wide behind ; front and hind edges straight. Meso- and meta-notum equal, much larger than first abdominal segment. Color, ochraceous and piceous. Front margin of pronotum and hind margins of thoracic and

abdominal segments, with apex of ovipositor, piceous brown. The characteristic feature of the species is, however, the two light colored elliptical markings upon the disc of the pronotum, as shown in the figure.

♀ 4 m. m. and ♂ 3.85 m. m. in length.

Habitat. Atlantic States, from Maryland southward.

MYRMECOPHILA OREGONENSIS, n. sp.

Elongate oval, body somewhat contracted at its junction with the pronotum, which latter is slightly narrowed at its posterior edge, making its sides appear bulging. It is a more slender species than the preceding, the female of this insect being very similar to the male of that species. Pronotum small, with the sides rounded, posterior edge very slightly arcuate; meso-, meta-notum and first abdominal segments equal. Cerci or anal stylets comparatively slender, 1.2 m. m. in length. Ovipositor 1.5 m. m. in length, medium stout, with the external sheaths slightly longest and pointed, with the points directed outward; internal ones acuminate. Color piceous brown above, with the under side and base of segments lighter. Antennæ concolorous. Disc of pronotum also light colored, but without the two elliptical spots, which are present in *M. Pergandei.*

Female 3.90 m. m. in length, male unknown.

One mature female and a pupa of this last species were collected at Portland, Oregon, in the summer of 1882, by Mr. Samuel Henshaw, of Boston, Mass. The types are deposited in the Museum of Comp. Anat., Cambridge, Mass.

OBITUARY NOTICE.

Mr. Anson Allen died at his home in Orono, Feb. 8, 1884, in the 55th year of his age. He was, without doubt, one of the best collectors, and one of the most careful, accurate and acute observers of insects, their habits and transformations, that we had among us. For a number of years past he spent nearly all the time he could spare from his business in collecting, breeding and exchanging Lepidoptera, and many collections, both in this country and Europe, have been enriched by additions from his exquisite preparations.

Mr. Allen would never save an insect unless it was absolutely perfect, except such as were very rare. For several years he bred from the eggs,

columbia, *cecropia* and many others in large numbers, and although he could not be prevailed on to publish his observations on the early stages of these moths, the conclusion he reached, that *columbia* is a good and distinct species, is worthy of careful consideration.

He corresponded with very many of our prominent Entomologists, and made extensive exchanges; and many, when they read these lines, will be pained to learn that he is with us no more.

Mr. Allen was one of the most unassuming of men, and was appreciated at his best only by those who knew him intimately. He did not confine himself to insects, but made a fine local collection in other departments of natural history.

C. H. FERNALD.

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

In a list which is now being published by the Ottawa Field Naturalists' Club, of Coleoptera collected in the vicinity of Ottawa, I have indicated a considerable number of species which appear not to have been hitherto included in our Canadian lists. As a record of these species may be of some interest to readers of the ENTOMOLOGIST who may not see the above mentioned publication, I send you a list in which I have also incorporated a few species (distinguished by an *) which, while already recorded, are of unusual rarity or interest. About twenty per cent. of my species are yet unnamed, and a vast amount of work remains yet to be done before the Coleoptera of this district can be considered as satisfactorily known.

CARABIDÆ.

**Blethisa quadricollis* Hald. Two specimens taken under driftwood on shady shore of the Ottawa, in June.

Clivina americana Dej. Common, and the only species found.

Dyschirius hispidus Lec. Taken in swampy meadow.

Pterostichus diligendus Chd. Rare, under driftwood.

Amara exarata Dej. Two or three specimens only.

polita Lec. Rare, under stones.

Platynus propinquus, Gemm. Rare, in damp pastures.

Cymindis borealis Lec. In dry pastures, in July.
Brachynus americanus Lec. Common under stones along the river, with *perplexus* Dej. and *medius* Harris.

Having had but little opportunity for the collection of water-beetles, my species are not numerous, and I can say little as to their relative rarity or abundance. As soon as the ice melts I will endeavor to gain a fuller knowledge of our Hydroporini and allied tribes.

DYTISCIDÆ.

Hydroporus hybridus Aubé. Not rare in the Ottawa in May and Oct.
dichrous Mels. One specimen.
americanus Aubé. One specimen.
notabilis Sharp. One specimen.

HYDROPHILIDÆ.

Helophorus obscurus Lec. (var.) One specimen.
Hydrochus rufipes Mels. Common.
Hydrobius feminalis Lec. One specimen.
Cercyon pygmæum Ill. Rare.

SILPHIDÆ.

Hydnobius substriatus Lec. One specimen in October. Dr. Leconte informed me that this beetle was exceedingly rare.
Liodes geminata Horn. In fungus.

SCYDMÆNIDÆ.

A large number of beetles belonging to this, and to the following three or four families, as well as species from many other families, were secured from moss and swamp grass collected in several localities immediately before the setting in of winter. Although I have only four species belonging to the Scydmænidæ, one of these is considered by Mr. John B. Smith to be perhaps a new species.

Scydmænus n. sp.? Of same size as *fatuus* Lec., but easily separated from that species by its pale antennæ and legs.

PSELAPHIDÆ.

Bryaxis Brendelii Horn. Rare.
puncticollis Lec. One specimen.
tomentosa Lec. Very rare.

STAPHYLINIDÆ.

Many of my species in this troublesome family are still undetermined, but there are a few to record, including some which are MSS. species of Fauvel (determined for me by Mr. John B. Smith).

Aleochara gracilicornis Fauvel MSS.

Oxypoda tenebrosa Fauvel.

Gyrophæna corruscula Er.

**Staphylinus cæsareus* Cederh. In "New Species of North American Coleoptera," Part I., Dr. Leconte described as *S. ornaticauda* a specimen of this beetle from Canada (collection of Mr. Uhler), locality not stated. Whether the species, which is a European one, has been since taken in Canada, I do not know, but it has been found at Detroit. The single specimen taken by me was captured on 2nd June last, under a log in very moist ground, at Billings Bridge, two miles from the city.

Philonthus niger Mels.

lætulus Say. Rare. Perhaps confused by our collectors with *blandus*. Occurs in Lower Peninsula of Michigan.

agilis (?)

quadricollis Fauvel MSS.

Dianous cœrulescens Gyll. One specimen. This is also a European species, but is recorded from Lake Superior (as *D. chalybeus* Lec.)

Lathrobium rubripenne Fauvel.

Bryoporus cribratus Fauvel.

Mycetoporus lepidus Grav.

Trogophlœus nitellus Fauvel.

Geodromicus nigrita Mull. Occurs in Lower Peninsula of Michigan (= *Anthophagus verticalis* Say).

TRICHOPTERYGIDÆ.

Ptenidium evanescens Msh. One specimen from moss.

Nephanes læviusculus Matth. This minute species is apparently not rare in moss, and may be taken as so well described by Prof. Bell in ENTOMOLOGIST last year.

COCCINELLIDÆ.

Hyperaspis bigeminata Rand. Rare. This beetle is recorded from Lake Superior, Michigan and Buffalo among other places, and being so widely distributed, it seems strange that it is not in our lists.

Scymnus fraternus Lec.?

CUCUJIDÆ.

Læmophlœus convexulus Lec. Rare.

DERMESTIDÆ.

Dermestes bicolor Fabr. One specimen.
Cryptorhopalum ruficorne Lec. Rare.
Orphilus glabratus Er., var, Rare.

HISTERIDÆ.

Hister defectus Lec.
exaratus Lec.

BYRRHIDÆ.

Syncalypta echinata Lec. Very abundant a few years ago on the Parliament Buildings, but rarer of late.

DASCYLLIDÆ.

Scirtes orbiculatus Fabr. Several specimens of this pretty species were taken last summer, on weeds growing along a stream flowing through an old beaver meadow, but owing to the variety of plants growing intermingled, I cannot say on what species it occurred. Previously to last year only one specimen had been taken by me.

Cyphon collaris Guér. This species is rare, not more than half a dozen specimens having been captured.

(To be Continued.)

CERATOCAMPA (CITHERONIA) REGALIS, Fab.

BY JOHN HAMILTON, ALLEGHENY, PA.

In the first number of this volume one of your contributors, Mr. Clarkson, writing about *Citheronia regalis*, infers that the moth always appears about the end of May, regardless of the time at which the larva enters the earth, and that it is the habit of the pupa to work out of the earth and lay on the surface of the ground during the winter. The first statement is correct in a certain sense. The insect in question is not uncommon here, and I have had them in numbers. Take a larva captured the first week in August and another the last in September, and allow them

to pupate in the same box and to remain together—they will disclose within a day or two of each other; but whether at the last of May or at some other time, depends on the temperature at which they have been kept. Keep the pupa of the one taken in August at a temperature a few degrees lower than that of the September one, and it will disclose much later, perhaps about the time the offspring of the other are entering the earth. I had one pupa that did not disclose till June of the second year. The time of development seems to largely depend on the temperature that surrounds the pupa—a fact that is well known.

The coming of a pupa to the surface is the exception, and not the rule. Those of several other earth-inhabiting species do the same when the ground selected or forced on the larvæ is unsuitable. This occurs in nature as well as in confinement. Take two parts of sandy loam, such as is used by plasterers, and one part of black, friable soil from the woods; mix together, put, to the depth of eight inches, in a good sized tin or iron box, and when the larvæ disappear cover over with a layer of moss, and then no pupæ will come to the surface.

As soon as the pupa is fully formed it commences a series of gyrations that result in the formation of an earthy cell, roomy, much larger than itself and impervious to ordinary moisture. This prevents it from being crushed by the expansion of the surrounding earth by freezing, and also from shriveling up by the absorption of its moisture in time of drouth; or from drowning from excessive wet. In hard ground the larva cannot penetrate deeply, nor make a wide excavation, and in endeavoring to enlarge its narrow surroundings it wriggles itself to the surface, where it stands small chance to survive to the time of disclosure.

ENTOMOLOGICAL NOTES.

BY PH. FISCHER, BUFFALO, N. Y.

I have often read articles about keeping parasites out of cabinets, and have seen in many entomological papers different remedies suggested to keep them from destroying, in a very short time, even the largest collection. I will now add my own experience, and remedy which always proved to be efficient during my 14 years' collecting, in which time I have not even lost one specimen. It will especially prove of interest to the

beginner. In the first place I would advise all those who cannot afford a large cabinet with good fitting drawers, to go to any good joiner and have some boxes made after the following pattern: Take the lumber about three-sixteenth inch thick for top and bottom, for the sides quarter of an inch. Have the box about 15 inches long by 12 inches wide, and 4 inches thick outside measure, and shape it book form, the bottom and top a quarter of an inch projecting. That portion which represents the cover of the book is cut into lengthwise, so as to make two receptacles, each about two inches high. The back is made of three-quarter inch lumber, in the shape of the back of a real book, which is covered with some strong cloth or thin leather outside, and cloth inside, to act as hinges. The two parts will have to be constructed so that they will, by closing them, fold together about a quarter of an inch. Have this neatly covered and lined with a suitable soft material, and it will be a tight and handy box for any kind of insects. Before transferring insects in a new box, I put them on cork and expose them to a moderately hot oven, which I also invariably do with insects received through exchanges. After a certain time, say half an hour, I take them out, and they are placed in the box, in which is pinned a little sponge the size of a small nut, saturated with carbolic acid (crystallized), which has to be renewed every 6 or 8 weeks. Old cabinets infested with parasites, when once introduced, can be cleared by the same method, only that the drawer or box, before pinning back the specimens, also has to be exposed to the heat of the oven.

I promised you my further success in hatching Lepidoptera with artificial heat. Pupæ of *Hyperchiria io* taken to a warm room, 64–80 degrees, on Feb. 10, 1884, came out as follows:—

Feb. 24, one ♂ and one ♀.
" 26, one ♂.
Feb. 27, one ♀.
" 28, one ♂.
Mch. 1, one ♂.
" 3, one ♀.

Of the lot taken to the room on December 5, a ♀ of *T. polyphemus* hatched on Feb. 16, depositing 142 eggs within three days, commencing laying the first night; eggs, of course, were sterile.

BRIEF NOTES OF A TRIP TO POINT PELEE, WITH ADDITIONS TO OUR LIST OF CANADIAN BUTTERFLIES.

BY THE EDITOR.

During the summer of 1882, we paid a flying visit to Point Pelee, in company with some friends who were interested in Botany. This point of land extends directly south into Lake Erie, near the eastern boundary of the County of Essex, and is among the most southerly points in the Province of Ontario. On the west side of the Point the land is chiefly marsh until near the extremity, and is a prolific hunting ground for sportsmen in search of water-fowl; it is also a breeding place for millions of Neuropterous insects. The east shore is sandy, and between this and the marsh are several farms and a considerable area of uncultivated arable land more or less covered with woods.

We reached Essex Centre, on the Canada Southern Railway, the nearest point of access by rail, at 7 p. m., on the 28th of June, where we hired a vehicle and driver for three or four days, and drove that evening over an excellent road 18 miles to Leamington. The night was spent here and an early start made the next morning for the Point. A drive of about three miles brought us to the base of the Point, and after a journey of about eight miles farther, we reached the upper extremity.

The day was warm and pleasant, and during the last portion of this drive we saw more Dragon-flies and other Neuropterous insects than we had ever seen in our lives before; they literally swarmed everywhere, especially in sunny spots. They flew in our faces and buzzed about our ears as we were driving, and settled on our clothing in considerable numbers. After catching all that could be conveniently carried, we amused ourselves by swinging the net in different directions, catching a few dozen and then letting them fly again. Among the most numerous species were *Libellula basalis*, *L. trimaculata*, *L. exusta*, *Diplax intacta*, and *D. rubicundula*, with some others undetermined. During the drive there also floated past us on rapid wing several specimens of *Papilio cresphontes* and one or two *P. marcellus*, but they flew with the prevailing wind directly over the swamp, where pursuit was impracticable. As we passed a sunny spot in the woods, approaching the end of our journey, a small dark-colored insect was seen hovering about some flowers growing

by the road-side, which from its peculiar jerky flight, was evidently a *Thecla*. A brief chase resulted in its capture, when it proved to be *Thecla smilacis* Boisd., = *auburniana* Harris, never before, to our knowledge, recorded as occurring in Canada. As we approached the extremity of the Point, we left the swamps behind us and with them the multitudinous hosts of the larger Neuropterous insects, but several of the smaller species were present, associated with Dipterous insects, in prodigious numbers, flying in clouds from every tree and bush we touched, the vibration of their many wings causing a loud roar or buzz. The sides of houses and barns were so thickly covered with them as to almost hide the wood they rested on, but they did not venture inside the buildings.

The next day was unfavorable for collecting; the rain poured in torrents until early in the afternoon. As soon as it had ceased, we wandered several miles along the sandy roads and shores, and found many interesting plants and trees, but there were very few insects on the wing, excepting those belonging to the Neuroptera, which were everywhere in abundance. Late in the afternoon, while beating about among the bushes on the sand hills on the eastern shore, a yellow butterfly started up which at first was thought to be a pale *C. philodice*, but there was something unusual about its appearance and manner of flight which led us to pursue it until captured. Imagine our surprise when we found it to be a female specimen of *Terias Mexicana* Boisd.

In W. H. Edwards' Catalogue of Diurnal Lepidoptera, *Thecla smilacis* Boisd. is said to be found in the Atlantic States, Mississippi Valley and Texas, while the localities given for *Terias Mexicana* are Texas to Arizona; California, occasionally in Kansas and Nebraska.

Since both these butterflies are new to our Canadian lists, we append descriptions of them.

Thecla smilacis is thus described by Boisduval: "Upper side blackish brown, with a pale whitish spot near the middle of the costal edge; the secondaries have two thin tails as in the analagous species.

"Under side greenish, often washed with a little reddish, with a transverse whitish ray sinuous on the primaries, tortuous on the secondaries, bordered in front by a ferruginous tint. Between this ray and the base, the secondaries have another short transverse sinuous ray of the same color. The extremity is marked by two or three ashy crescents, of which the intermediary is black in front, and the third in a line with two or three

small ferruginous spots, more or less distinct. The anal palette is black, and near the fringe there is a small white marginal line.

"Larva, which feeds on *Smilax*, is green, with the head and feet blackish. It has four rows of red spots, of which the two dorsal are formed of smaller spots, and one on each side composed of spots somewhat larger.

"Chrysalis grayish-brown, with the abdomen more clear and reddish."

Harris, who regarded this species as distinct from *smilacis*, thus describes it under the name of *auburniana*, and Harris' description agrees more closely with the specimens captured by us than does that of Boisduval. Harris says: "The outermost of the tails of this insect is very short, and often nothing remains of it but a little tooth on the edge of the wing. It varies considerably in color; the females are generally deep brown above, but sometimes the wings are rust-colored or tawny in the middle, as they always are in the males; the oval opaque spot which characterizes the latter sex is ochre-yellow. Upon the under side the wings in both sexes are green, the anterior pair tinged with brown from the middle to the inner edge; externally next to the fringe they are all margined by a narrow wavy white line, bordered internally with brown; this line on the fore wings does not reach the inner margin; on the hind wings it consists of six spots arranged in a zigzag manner, and the last spot next to the inner margin is remote from the rest; besides these there are on the same wings three more white spots bordered with brown between the zigzag band and the base; and between the same band and the margin three black spots, behind the middle one of which is a rust-red spot with a black centre. The wings expand from $1\frac{2}{10}$ to $1\frac{3}{10}$ inch. This pretty species is found on the mouse-ear *(Gnaphalium plantagineum)* in May, and on the flowers of the spearmint in August."

"*Terias Mexicana* Boisd. Boisd. Spec. Gén. 679. Figured on pl. 3, C. fig. 1, of Boisd. Spec. Gén.

"Wings brilliant citron yellow; primaries with a black border at the extremity, rather wide, ending squarely at the internal angle, showing near the middle a rather deep quadrangular sinus; the outer edge slightly sinuate, and whitish; secondaries, with the middle of the exterior edge prolonged to a prominent angle, in the form of a tail; a black border of moderate width, a little dentated on its internal side, not reaching the

internal angle; costal edge washed with orange yellow, mingling with the ground color.

"Under side of the primaries pale citron yellow, with a black central point, the edge intersected with brown points; the outer edge reddish near the fringe.

"Under side of secondaries yellow, sprinkled with ferruginous atoms, with a blackish central point; edge intersected with ferruginous points, and marked near the external angle with a spot of the same color; the posterior half having four or five other spots of the same color, of which two or three are in a line, and tending to form a transverse band; the middle of the outer edge more or less washed with ferruginous.

"Female differs from the male in the upper side being yellowish white, with a wider border, the quadrangular sinus more profound; the anterior edge of the secondaries widely orange yellow, and below, three ferruginous posterior spots form on the secondaries a narrow, transverse, ferruginous band.

"Texas—Louisiana—Mexico."

Among the other insects taken were *Papilio cresphontes*, *P. turnus*, *P. troilus*, *Colias philodice*, *Terias lisa*, *Argynnis cybele*, *Phyciodes tharos*, *Pyrameis huntera*, *P. atalanta*, *Anchyloxypha numitor*, *Pholisora catullus*, *Eudamus tityrus*, *Eudryas grata*, *Leucania unipuncta*, *Lucanus lentus* and *Macrodactylus subspinosus*. The latter species was very common on the flowers of the tulip tree *(Liriodendron tulipifera)*, which was then blooming freely; also on the sour gum or Pepperidge tree *(Nyssa multiflora)*.

The next morning we started early on our return journey and reached Essex Centre in time to take the afternoon train home. Had the weather been favorable we should doubtless have reaped a much richer harvest.

THE HAIRY LARVÆ AND THEIR PARASITES.

BY FREDERICK CLARKSON, NEW YORK CITY.

It is generally acknowledged by Entomologists that the hairy larvæ, such as the Arctians and their allies, very commonly escape parasitic attack, a circumstance attributable to the fact, that in order to permit the deposit of ova, these caterpillars must be discovered by the parasites in favorable postures, or else worried by them into such, that the spines separating, give the only opportunity for the insertion of the ovipositor.

This was clearly demonstrated in an attack made by an Ichneumon upon a larva of *Apatela Americana* Harris, which came under my observation in the early part of last autumn. This genus belongs to the family of the Noctuidæ, the larvæ of which, like the Arctians, are clothed with dense spinular hairs. The caterpillar had secured itself by its abdominal legs to the midrib of a maple leaf, having the fore part of its body elevated, similar to the attitude common to the larvæ of the Sphingidæ. The parasite displayed great energy in the effort to deposit, seemingly as if to compel the caterpillar to change its position, but as the caterpillar remained immovable for many minutes, probably a quarter of an hour, I was led to the conclusion that it realized its security in the position it had taken. After driving the parasite away, I discovered that the caterpillar, though perfectly life-like in form, was dead, and as hard as if petrified, and that the parasite, guided, as it would appear in this case, solely by sight, had been, like the Entomologist, thoroughly deceived. In view of the commonly accepted opinion, that insects are attracted by odor, not only to their own food, but to the proper food for their progeny, whether it be animal or vegetable, I have referred to this incident, as contributing to the theory that the parasite, in providing food for its progeny, seeks it by sight; for it would seem most improbable that a dead and dried caterpillar should retain a sufficiency of its natural odor to attract. The incident also illustrates, by the mode of attack and the prolonged effort at oviposition, that the caterpillar must be brought into an attitude favorable for the reception of the egg. I am inclined to the opinion that the reduction of these moths through the instrumentality of parasites, is largely effected while in the pupa condition, having noted this peculiarity of habit during our recent extraordinary visitation of the *O. leucostigma* Smith. The full grown larvæ of this species, collected by me, developed into moths, while from cocoons gathered it was not uncommon to obtain parasites. The cocoons of the hairy larvæ commonly consist of loose interwoven hairs, and are not so dense but that the pupa is readily discoverable by the parasite, even if the cocoons themselves do not attract them.

LARVA OF DOLBA HYLÆUS?

BY W. HAGUE HARRINGTON, OTTAWA.

On the 29th July last, while beating along the margin of a small stream, I found on my net a larva which had apparently fallen from an alder-

bush and which was unknown to me. I took it home, but it refused to feed upon alder, and I was unable to identify it and find out upon what to feed it. The only descriptions I had at hand were those of Mr. Reed in Annual Report for 1881, and no one of these seemed to answer. Finding that it refused every plant which I offered to it, and yet did not seem prepared to pupate, I put it in spirits, which, however, so discolored and shrivelled it that I threw it away. While it was alive I made the following brief note of its appearance: Light green, whitish on back, covered all over with white dots edged with black, but these most conspicuous on thoracic segments and substigmatal surfaces. Head granulated, margined by yellow and black line. Legs pink, stigmata orange fawn-color. Seven oblique white lines edged with rose and black, the last line prolonged to the caudal horn, which is long and slightly curved, with black sides and rough. It was my intention when jotting down this memorandum (to assist me in identifying the larva) to make a more full and minute description, which unfortunately I neglected to do. Recently in reading in *Psyche* the descriptions of larvæ of Sphingidæ, I came across one (Vol. II., page 77) which immediately recalled to me the larva I had taken in the summer. It is the description of a larva considered to be probably that of *Dolba hylæus*, and of which the food is sweet fern. The principal points in the description of the mature larva are as follows: Head scabrous; sphingial bands yellow or white edged with crimson, and this crimson often followed above by a narrow margin of black; horn black on the sides, with slight lateral yellow stripe, green above and beneath; the whole body profusely sprinkled with circular white dots having a black areola; spiracles testaceous, afterwards bright reddish, prolegs light brown. On turning to Mr. Reed's paper I find for this species: "Head green, with a pale blue line on each side; body pea-green with lateral oblique pink bands edged below with white; caudal horn crimson." (Abbot and Smith.) My object in sending this note is to find out whether it is now definitely known that the larva answering to these descriptions is that of the species to which it is referred. The moth has not been taken here yet so far as I know. I found last summer several other species in early stages, but did not attempt to rear them. Among them was one less than an inch long taken on button bush; thoracic segments lessening to head, which was small; general color pale green; covered all over with minute prickles or granules; horn very long and prickly.

TO OUR MEMBERS.

Ottawa, April 7, 1884.

Gentlemen : Having been honored by the Council of the Entomological Society of Ontario by being nominated as the delegate to represent that Society at the approaching meeting of the Royal Society of Canada, I shall feel obliged if any members who are desirous of availing themselves of the privilege extended by the Royal Society of having papers read before that learned body, will correspond with me without delay, so that I may make the necessary arrangements.

I would also draw attention to the last clause of No. 11 of the Regulations of the Royal Society, by which it is intimated that the Royal Society will receive suggestions from associated Societies on any matters in which the Royal Society may be of assistance in carrying out the objects of the Society. It was under this clause that your delegate last year brought before that Society the advisability of having a more liberal interpretation of the postal laws regulating the transmission of natural history specimens between students in Canada and those in the United States and Europe, and also suggested that the Government should be petitioned to allow scientific bodies to import free of duty all illustrations, etc., needed for their publications. I am, gentlemen,

Yours very truly,

J. FLETCHER, V. P. Ent. Soc., Ont.

LIST OF DIURNAL LEPIDOPTERA COLLECTED IN THE NORTH-WEST TERRITORY AND THE ROCKY MOUNTAINS, DURING SEASON OF 1883, WITH LOCALITIES.

BY CAPT. GAMBLE GEDDES, A. D. C. TO LIEUT.-GOVERNOR OF ONTARIO.

(Continued from Vol. xv., Page 223.)

93. Argynnis Leto ♀, Behr. Fort Macleod.
94. " Bellona, F. Fort Ellis.
95. Lycæna Fulla, Edw.
96. " Melissa, Edw. Oxley Ranche.
97. " Neglecta, Edw. Fort Ellis.

98. Lycæna Lygdamas, Doubld. Fort Ellis.
99. " Icaroides, Bd. Red Deer River.
100. Pamphila Nevada, Edw. (?) Fort Macleod.
101. " Colorado, Scud. Medicine Hat.
102. " Idaho, Edw. Moose Jaw.
103. Phyciodes Camillus, Edw. Edmonton.
104. " Marcia, Edw. Edmonton.
105. " Nycteis, Doubld. Edmonton.
106. Argynnis Nevadensis, Edw. Calgarry.

LIST OF ZYGÆNIDÆ AND BOMBYCIDÆ TAKEN AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

ZYGÆNIDÆ.

Alypia octomaculata, Fabr. Rare.
" Langtonii, Coup. 1 ex.
Eudryas unio, Hübn.
Scepsis fulvicollis, Hübn.
Ctenucha virginica, Charp.
Lycomorpha pholus, Drury.

BOMBYCIDÆ.

Nola minuscula, Zell. Rare.
Argyrophyes nigrofasciata, Zell. Rare.
Clemensia albata, Pack.
Crambidia pallida, Pack.
Hypoprepia fucosa, Hübn.
Llthosia bicolor, Gr. 1 ex.
Euphanessa mendica, Walk.
Crocota rubicundaria, Hübn.
" quinaria, Gr. Rare.
" opella, Gr.
Utetheisa bella, Linn. Rare.
Callimorpha Lecontei, Boisd. Rare.
Platarctia borealis, Moeschl 1 ex.
Arctia virgo, Linn.
" Saundersii, Gr.
" figurata, Drury. Ra
" virguncula, Kirby.
Pyrrharctia isabella, A. & S
Phragmatobia rubricosa, H r.
Leucarctia acraea, Drury.
Spilosoma virginica, Fabr.
Hyphantria cunea, Dru y. Spotted form, rare; pure white rm, common.
Euchaetes egle, Drury.
" Oregonensis, Stretch. Very rare.
Halisidota tessellata, A. & S.
" caryæ, Harris.
" maculata, Harris.
Orgyia nova, Fitch.
" leucostigma, A. & S.
Parorgyia Clintonii, G. & R. Rare.

Parorgyia parallela, G. & R. Very rare.
Dasychira Lintneri, Gr. 1 ex.
Euclea querceti, H.-S.
Limacodes biguttata, Pack. 1 ex.
" fasciola, H.-S. Rare.
Packardia ocellata, Gr. 1 ex.
Tortricidia testacea, Pack. Rare.
Ichthyura inclusa, Hübn. Rare.
" albosigma, Fitch.
" vau, Fitch.
Datana ministra, Drury.
" integerrima, G. & R.
Nadata gibbosa, A. & S. Rare.
Gluphisia trilineata, Pack.
Notodonta stragula, Gr. Rare.
Lophodonta ferruginea, Pack.
" angulosa, A. & S. Rare.
Pheosia rimosa, Pack. Very rare.
Nericodia bidentata, Walk.
Edema albifrons, A. & S.
Seirodonta bilineata, Pack.
Oedemasia badia, Pack. Rare.
Dasylophia interna, Pack. 1 ex.
Cœlodasys unicornis, A. & S.
Ianassa lignicolor, Walk. Rare.
Heterocampa marthesia, Cram.
Heterocampa cinerea, Pack.
" subalbicans, Gr.
Cerura occidentalis, Lintn. Rare.
Platypteryx arcuata, Walk.
Prionia bilineata, Pack. Rare.
Dryopteris rosea, Walk, Rare.
" irrorata, Pack. Very rare.
Actias luna, Linn.
Telea polyphemus, Cram.
Platysamia cecropia, Linn.
" columbia, Smith. Rare.
Hyperchiria io, Fabr.
Dryocampa rubicunda, Fabr. Rare.
Clisiocampa americana, Harr.
" disstria, Hübn.
Gastropacha americana, Harr. 2 ex.
Tolype velleda, Stoll. Rare.
Prionoxystus robiniæ, Peck. Very rare.
Hepialus argenteomaculatus, Harr. Rare.
Hepialus quadriguttatus, G. Very rare.
Hepialus mustelinus, Pack. Very rare.
Hepialus gracilis, Gr. Rare.

BOOK NOTICES.

Proceedings and Transactions of the Royal Socieiy of Canada.

The first volume of the Transactions of the above Society, covering the work done during the years 1882 and 1883, has been received. It is a handsome quarto volume of 720 pages, illustrated by 13 plates. The first 71 pages is devoted to an account of the Proceedings of the Society for the years 1882 and 1883; the remainder is divided into four sections —1st, French Literature, History, etc., occupying 165 pages; 2nd, Eng-

lish Literature, History, etc., 96 pages; 3rd, Mathematical, Physical and Chemical Sciences, 98 pages; 4th, Geological and Biological Sciences, 286 pages. The matter is well printed and on excellent paper, and the whole work—notwithstanding that the lists of *errata* are rather longer than they should be—is a credit to the country and an evidence of solid progress in scientific research in Canada.

Ottawa Field Naturalists' Club, Transactions, No. 4, 1882–1883; 8vo., pp. 89, with one plate.

This number, although somewhat late in being issued, is highly creditable to the Club, and shows that its members are still actively engaged in working up the natural history of their locality. Following the Report of the Council is the excellent and instructive address of the President, Mr. James Fletcher, who is also Vice-President of the Ent. Soc. of Ontario. Next in order are valuable papers on the Laurentian System, the Fishes of the Ottawa District, the Ducks of the locality, etc. There are also reports from the general branches of Geology and Mineralogy, Paleontology, Botany, Conchology, Ornithology, and Entomology, the last occupying six pages with the record of its excellent work. We heartily congratulate our fellow laborers in natural science belonging to this Club for the excellent example they have set their sister cities in Ontario by their thoroughness and enthusiasm.

The Butterflies of Maine; by Prof. C. H. Fernald. 8vo., pp. 104, illustrated with 28 figures.

Our thanks are due Prof. Fernald for a copy of this work, designed more especially for the use of students in the Maine State College, but one which will be found very useful to all who take an interest in our northern butterflies. In the introduction, which occupies 18 pages, brief reference is made to the classification, transformations, external and internal anatomy of insects, followed by an accentuated list of the names of butterflies and an artificial key designed to aid in determining the 59 species which are recorded as found in Maine. The descriptions are written in a plain and practical style, as free from technicalities as the subject will admit of.

Papilio: A Monthly Journal Devoted Solely to Lepidoptera.

This excellent publication, which has been so ably conducted for the past three years by Mr. Henry Edwards, of New York, has passed into the hands of Mr. Eugene M. Aaron, Curator of the American Entomological Society, Philadelphia, who will continue to publish it as heretofore.

The enthusiasm and ability Mr. Aaron brings to the task will, we have no doubt, enable him to fully maintain the good name this journal has already acquired. We sincerely hope that entomologists generally will aid this useful work by subscribing for it, and we trust that under Mr. Aaron's able management the career of *Papilio* may be an eminently successful one. Mr. Aaron's address is Lock-box 2,500, Philadelphia, Pa.

The Canadian Sportsman and Naturalist.

We regret to learn of the demise of this useful journal. Three volumes have been published, containing much valuable information concerning the natural history of Canada.

CORRESPONDENCE.

The Entomological Society of Washington has organized with the following officers: President, Dr. C. V. Riley; first Vice-President, Dr. J. G. Morris; second Vice-President, Geo. Marx; Recording Secretary, E. A. Schwarz; Corresponding Secretary, L. O. Howard; Treasurer, Ben. P. Mann; Executive Committee, the officers and Dr. W. S. Barnard, P. R. Uhler and Dr. A. J. Shafhart.

The first regular monthly meeting of the Society was held April 3rd, in the Council Chamber of the U. S. National Museum. The following papers were read:—

1. Some New Facts Concerning the late Townend Glover—C. V. Riley.
2. On Insect Collecting at Pt. Barrow, Alaska—Jno. Murdoch.
3. On the Insect Fauna of the District of Columbia—E. A. Schwarz.
4. On the so-called "Mistaken Parasite."—L. O. Howard.

The active membership list of the Society numbers over twenty names. Regular meetings are held on the first Thursday evening of each month.

L. O. Howard, Corresponding Secretary.

Change of Address.—The Rev. F. W. Fyles has removed from Levis, P. Q., to South Quebec. Parties sending him communications will please bear in mind this change.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., APRIL, 1884. No. 4.

NOTES ON THE ENTOMOLOGY OF VANCOUVER ISLAND.

BY GEO. W. TAYLOR, VICTORIA, B. C.

Since I came to this island, a couple of seasons ago, I have made a practice of capturing any insects that came in my way, and I have sometimes made an expedition purposely in pursuit of such prey. The result is an accumulation of about one thousand species of all orders, which probably represents not more than five per cent. of our insect population.

As my favorite studies are in another department of Zoology, I have neither the inclination nor sufficient knowledge to work out all this material myself, but with the help of entomological friends, resident, alas! sadly, too far off, I am gradually making progress with the naming of my captures, and I propose, with your permission, to publish from time to time in the CANADIAN ENTOMOLOGIST, lists, with notes, of the species that have occurred to me. I hope that this will be both useful and interesting to Eastern entomologists, as I notice that hardly more than one half of the insects I have already identified are named in the recently published check list of Messrs. Brodie & White, and many of them will prove, I think, new to science.

This month, however, I will content myself with a few general and preliminary remarks. Our climate (I am speaking only of the south-easterly portion of Vancouver Island) is supposed to resemble that of the south of England, but I should call it decidedly milder. Our spring is warm and early, and the summer hot and dry, but with cool nights and copious dews. On the other hand, the winter is mild, and for about three months exceedingly wet. All kinds of vegetation are very luxuriant. The uncultivated lands are thickly covered with heavy timber, and the cultivated lands are at present few and far between, which makes it easier to combat the attacks of our noxious insects (and of these we have not a few). All our climatic conditions, except perhaps the wet winter, are favorable to abundant insect life, and this undoubtedly exists here. There are several points about our insect fauna that cannot fail to strike an observer. In the

first place the extreme abundance of Diurnal Lepidoptera must attract attention. Nearly 40 species may be marked *abundant*. A patch of blossom in May, covered with *Blues* and *Frittillaries*, with an occasional *Colias* and two or three magnificent species of *Papilio*, is a sight such as an English entomologist, at least, never sees at home, and later in the year the hundreds of *Vanessa*, *Chrysophanus*, *Pamphila and Limenitis* make a very different but not less beautiful picture.

The Orthoptera, too, intrude themselves upon our notice. Grasshoppers in thousands exist in some localities, and do considerable mischief, and large and gorgeous species, with red or yellow under wings, astonish the uninitiated by their sudden appearance or equally sudden vanishing. Two kinds of Cricket fill the air with music in early summer, and a couple of species of *Cicada* lend them most efficient aid. Of Hemiptera, Neuroptera and Diptera I have not collected many, perhaps only 200 species in all, but they include some remarkably fine kinds. Among the Coleoptera I am struck with the abundance of *Adephaga*, many of them, too, being of large size. The genera *Calosoma* (e. g. *tepidum* Lec.), *Cychrus* (*marginatus* Dej. and *angusticollis* Fischer), *Carabus* (*tædatus* Fabr.), *Omus* (*Dejeani* Reiche and *Audouini* Reiche), *Holciophorus*, *Promecognathus*, &c., being represented by very fine species. The Longicornes, too, are abundant, and most of them are absent from Brodie & White's list. The Elateridæ and Buprestidæ are also numerous; in fact all wood-feeding insects seem to abound, as do carrion feeders, while on the other hand, Lamellicornes are very scarce.

Our Hymenoptera are fine and interesting; the *Vespas* are in fact decidedly *too* fine. *V. maculata* Fab., *V. media* Oliv., and a supposed new species, being remarkably plentiful and pugnacious. Less plentiful, but no less conspicuous and interesting, are the Uroceridæ, my first five specimens proving to belong to as many different species.

Nearly one hundred species of Hymenoptera (about half my collection) have been identified for me through Mr. Brodie, of Toronto, and they are consequently most of them included in his check list. These shall form the subject of my next communication, and in concluding for the present, I may mention that my duplicates and the loan of my type specimens in any particular family or order will be accorded with very great pleasure to any specialist who will favor me with a request for the same.

NOTES ON THE TORTRICIDÆ.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, MAINE.

At the time when my Catalogue of the Tortricidæ was published, I was inclined to believe that *Cacœcia transiturana* Walk., and *C. obsoletana* Walk., were the same species, for they were taken in the same localities, and only females of the former and males of the latter species were to be found in collections.

Prof. Forbes has recently sent me two examples for determination, which he bred from two lots of leaf-rollers on the strawberry, in Illinois, and from each lot he obtained males and females, all the males being *obsoletana*, and all the females *transiturana*. We may, therefore, consider the question settled by Prof. Forbes, and these two insects are only the two sexes of our species, which should be known as *Cacœcia obsoletana* Walk.

When I was examining these insects, I was struck by the close resemblance which the males bore to *Cacœcia zapulata* Robs. Of this species only two examples, both males, are at present known; one, the type, taken in Illinois, and the other, now in Prof. Riley's collection, taken in Missouri. *C. zapulata* is considerably larger than *obsoletana*. It is hoped that Prof. Forbes will be able to settle the question whether these two are distinct from each other or not. He will undoubtedly give us the early stages of *obsoletana* in his report.

In the Bulletin of the Entomological Commission, No. 6, page 82, Prof. Riley expresses the opinion that *Teras oxycoccana* Pack., *T. cinderella* Riley, *T. malivorana* LeBaron, and *T. vacciniivorana* Pack., are dimorphic forms of one species. At the time when my Catalogue went to press, I thought it better to allow them to appear as distinct, but made the statement in a foot-note that "surely *oxycoccana* Pack. must be distinct." I had the type of *oxycoccana*, and did not feel prepared to admit that an insect so unlike the others could be the same thing.

During last summer Mr. J. B. Smith collected and raised a large number of the so-called cranberry worms in New Jersey, and many were sent to the Department of Agriculture and bred there, so that there seems to be no doubt that Mr. Smith and Prof. Riley have proved the dimorphism of the insect. Mr. Smith had the kindness to send me a considerable number for examination, but they were all the slate-colored form, or *T. cinderella* Riley. I therefore wrote to Prof. Riley, who sent me a gener-

ous supply of all the forms bred. There were the plain slate-colored form, the slate-colored with red scales mixed in, and the orange-colored form, the *malivorana* of LeBaron, which, without much doubt, is identical with *vacciniivorana*, though the type of the latter is lost, and we now have only a brief description to determine it by. Now, what greatly surprised me in the examination was to observe at once that the orange forms were *Teras minuta* Robs, which was re-described by Zeller as *Teras variolana*. I have, for several years past, taken a *Teras* here in considerable numbers, late in September, which I have sent to several correspondents in Europe, who have written me that they were quite unlike anything there. These proved to be like the slate-colored and red mixed form mentioned above, except considerably larger; I can see no difference except in size. There is no cranberry growing where these are found, but other related plants, as blueberry, upon which they might have fed. My impression is that they hibernate in the imago state, but of this I am not sure. A few years ago I received several specimens from Mr. G. M. Dodge, of Glencoe, Neb., "bred on wild rose," which are so like those taken here that I could separate them only by their greater depth of coloring and their much larger size, for they are as much larger than those taken here, as these are larger than those from Prof. Riley, and others from Texas. I received *T. minuta* from Mr. Dodge, and also from Mr. Morrison, taken in Nevada, and they were also unusually large. I am, therefore, inclined to believe them all the same species, but I am not yet ready to concede that *oxycoccana* is the same thing. It will be better to allow it to remain separate till it can be proved to be the same, rather than to unite them now, and have to separate them later, should they prove distinct.

The synonomy is as follows:

Teras minuta.

Tortrix minuta, Robs., 1869.
Tortrix malivorana, LeBaron, 1870.
Tortrix vacciniivorana, Pack., 1870.
Teras variolana, Zell., 1875.

The above are the orange forms.

Tortrix cinderella, Riley, 1872.

Riley's name may be used to indicate the slate-colored form.

Robinson's *T. minuta* was published in February, 1869, and Packard's *T. oxycoccana* not until April, 1869.

In December, 1878, I visited Prof. P. C. Zeller, and examined the

types of his N. A. Tortricids. At the time, I did not feel satisfied that *Sericoris argyrœlana* Zell., was distinct from *S. coruscana* Clem., but allowed both names to remain. After Prof. Zeller's death, his collection passed into the hands of Lord Walsingham, and I wrote to him about the matter. He made an examination and wrote me that they were identical, and that Prof. Zeller had evidently reached that conclusion, for he had placed them together in his collection.

I have recently examined a large number of examples of the European and American *Phoxopteris comptana* Frol., and compared them critically with *Phoxopteris fragariæ* Walsh & Riley, and I am convinced that they are the same thing. They are structurally identical, and my European specimens shade off into cinnamon-colored forms, so that I can find no line of distinction between them. The insect must, therefore, be known hereafter as *Phoxopteris comptana* Frol.

SOME FRAGMENTS OF INSECT STATISTICS.

BY THOS. E. BEAN, GALENA, ILLS.

* Pupal Term of Arctia nais.

♀ found June 16, 1875, laying eggs in a depression in ground recently dug. Total number of eggs obtained about 500, 16th to 19th of June.

Larvæ began to appear June 24th. They were fed chiefly on *Polygonum acre*, and one or two species nearest allied to *acre*, partly on *Polygonum aviculare*, var. *erectum*, and partly on red clover.

Pupation began July 23rd, and continued daily to August 8th, inclusive; a few more pupæ formed to the 16th inclusive, when pupation practically ceased. Only 5 pupations occurred later; two about 20th of August, one about 1st of October, and two in the last ten days of October.

After losses from larval mortality and escapes, there remained August 16th nearly 200 larvæ, almost mature. These shortly made final moult and early in September almost ceased feeding. The hybernating disposition took possession of them, and out of nearly 200 mature larvae remaining Sept. 1st., not more than three formed pupa before winter.

* Gladly giving some attention again to entomology, after several years neglect, I find a few of my former notes, which, as far as they extend, were carefully made, and may be of some use in supplementing other records, or for comparison of localities.

Pupal mortality, none.

Pupal hybernation, none.

Of the outcome from the pupae thus obtained previous to winter, the sex was noted of 196, 115 being males, 81 females.

The pupal term and mature sex of 165 were carefully recorded, summing up as follows:—

Pupal term nearest	10 days,	2	males,	8	females.
"	11 "	14	"	34	"
"	12 "	40	"	21	"
"	13 "	37	"	3	"
"	14 "	6	"	no	"

Average pupal term of 99 males, closely 12⅓ days.

" " 66 females, " 11⅓ "

The pupations of early dates produced a large excess of males. The earliest 10 pupae, July 23rd and 24th, gave 9 males and 1 female. From 43 pupations dating July 23rd to 27th inclusive, resulted 32 males and 11 females.

Pupae of intermediate dates, especially from July 28th to August 3rd inclusive, gave about equal numbers of both sexes.

In the later dates the males were again considerably in excess.

In spring of 1876 two *Arctia nais* larvae were collected; one gave pupa May 18th and male imago May 31st—pupal term 13 days; the other pupated June 15th, and female moth emerged June 27th—pupal term 12 days.

Hybernation of Spilosoma acræa.

This moth was rare in vicinity of Galena in 1875. Three larvae collected Sept. 19th and one Oct. 21st.

One made pupa Oct. 8th, the others Oct. 23rd to 25th. Moths appeared the following April, 17th to 26th, 2 males, 2 females.

The larvae showed no disposition to hybernate, although reaching mature stage so late in the season.

Spilosoma virginica.

Larvæ collected in September, 1875, spun up late in Sept. and during Oct., and moths emerged the next spring in cool room April 24th to May 9th. No observable tendency to larval hybernation.

Extreme color-variation found among the larvæ; from pale yellow to dark red-brown.

SPILOSOMA ISABELLA.

About 70 eggs were found June 7, 1876, in a compact group on a leaf of *Triticum repens*. The larvæ were fed on *Polygonums* and native asters. Record made July 12th of several larvæ of sizes from 1 inch to 1¾ inch, which differed from the ordinary pattern by being almost entirely black, and thus nearly lacking the red-brown area usually seen on the intermediate group of segments.

Nine pupæ were carefully recorded, with dates from July 15th to August 3rd:—

Pupal term 11 days—one.
" 12 " three.
" 13 " three.
" 14 " two.
Average pupal term, 12⅔ days.

The remaining larvæ were apparently all mature by August 1st, and on September 3rd there were still 22—none having pupated since August 3rd. Only one more pupation occurred before winter, dating Sept. 12th, and imago was disclosed not long after.

CATOCALA GRYNEA.

Larva found June 1st, 1876. Began forming pupa the same day. Moth emerged June 24th.

Another larva found June 11th, pupa formed June 12th, imago disclosed June 30th.

Another pupa dated July 1st, imago July 17th. Pupal terms approximately 16, 18 and 22 days.

CATOCALA ULTRONIA.

Larva found on apple-tree trunk June 5, 1876; began forming pupa June 6; imago appeared June 27.

Another larva was taken on native plum tree in garden; pupa formed June 9; imago appeared July 2.

Pupal terms approximately 20 and 23 days.

HYDROECIA SERA.

Larva found June 11, 1876, on native anemone, *Anemone pennsylvanica*, or closely allied species.

Pupa June 15; imago June 28.

MAMESTRA ADJUNCTA.

Larva, half inch long, found Sept. 16, 1875, on Celeriac. Was fed up partly on Celeriac and partly on *Weigelia rosea*. Pupated about Oct. 5, and imago appeared about 6th of following May.

Another larva was taken on *Weigelia rosea*, Oct. 4, 1875, being then 1¼ inch long. Pupated Oct. 13, and the moth appeared May 14, 1876.

VANESSA ANTIOPA.

Seven larvæ, nearly mature, were taken from a poplar tree late in June, 1875.

Two pupated June 30th, the other five July 1st; all disclosed imago July 12.

Pupal term of two, 12 days; of five, 11 days.

CHRYSOPHANUS THOE.

Female taken June 25, 1876. Placed with twigs of dock, *Rumex crispus*, one twig having a flower panicle, and upon the flowers the eggs were chiefly deposited.

Eggs laid by 28th June, and larvæ began to appear by 4th July.

Earliest pupations July 16th, others to July 21st inclusive, 29 in all.

Imagines appeared from July 24th to August 1st inclusive, 16 males, 13 females.

Pupations of earlier dates gave chiefly males; later dates gave an excess of females.

Pupal term:—

Term	8 days,	3 pupæ,	produced	3 males.				
"	9 "	16 "	"	11 "	5 females.			
"	10 "	9 "	"	1 "	8 "			
"	11 "	1 "	"	1 "				

BOOK NOTICES.

Notes on the Rearing of Silk-producing Bombyces, in 1883, by Alfred Wailly. From the Journal of the Society of Arts, 8vo., 6 pp.

Mr. Wailly has devoted much attention for the last ten years to the rearing and study of the various silk-producing Bombyces of China, Japan, India and America, with much success, the recent results of which are given in this report. The American species he has experimented with are *Telea polyphemus*, *Actias luna*, *Samia promethea*, *Platysamia cecropia*, and *Hyperchiria io*.

NOTES ON PEGOMYIA BICOLOR (WIEDEMANN), A LEAF-MINING FLY NEW TO CANADA.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Egg laid on the under side of the leaf of the Dock (*Rumex obtusifolius*). Newly hatched larva bites through to the upper surface of the parenchyma, and works under the epidermis, until the leaf presents a blistered appearance. Sometimes three or four larvæ are found in one leaf.

Full-grown larva, four-tenths of an inch long, white, semi-transparent. Segments marked with greenish yellow. Head retractile, furnished with a snout-like process, the apparent use of which is to raise the epidermis as the creature feeds. Mouth set back. Alimentary canal visible under the microscope, also two ducts terminating in spout-like organs protruding from what appears to be the *upper* edge of the somewhat truncated last segment of the larva. The tuberculose spiracles on the second segment very conspicuous; on the third, less so, and so on diminishing.

The insect left the leaf and pupated on the 22nd of September. Whilst undergoing the change it assumed a leaden-blue color.

Pupa, two and a half tenths of an inch in length; chestnut-brown; ovate. Segments slightly marked. Two considerable prominences at the head. The anal protuberances, as above described, hardened and conspicuous.

Perfect insect appeared in a warm room early in April. It presents a bristly appearance. Head, large. Front, white. Palpi, red. Eyes, full, madder brown in color. Large joint of antennæ sienna-colored, infuscated. Thorax, large and rounded, rich dark brown. Legs, sienna-colored. Wings medium sized. Costal margin thickly set with short hairs. Veins broadly marked, dark brown. Wing-sockets furnished beneath with a white fibrous edging. Halteres small and light-colored. Abdomen small compared with head and thorax, and long as compared with its own diameter, cylindrical, truncated, sienna-colored, set with long brown bristles.

I am indebted for the identification of this insect to Mr. Meade, who says: "I belive that this species has not been recorded as an inhabitant of North America, but it is very common in the north of Europe. I have bred numerous specimens from the leaves of both *Rumex obtusifolius* and *R. crispus*. Zetterstedt says it is equally common in the north of

Scandinavia as it is in England. There was no specimen of this species in the collection of American Anthomyidæ which I received some years ago from the Museum at Cambridge, Mass.

"Your specimen exactly corresponds with some of the English ones which I possess. It is rather a variable species; the 1st and 2nd joints of the antennae are sometimes nearly black, when it has been named *A. mitis* by Meigen; but they are mostly rufous. One characteristic point is that the palpi should be entirely yellow or red, *not* black at the tips as in *Pegomyia nigritarsis* Zett., a species which also mines the leaves of the Dock, in the larva state. I have bred both species from the same leaf of *R. obtusifolius*."

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 47.)

CORRECTION.—Page 46, line 9, for "Uhler" read Ulke.

ELATERIDÆ.

Fornax badius, Mels. One specimen. The only list in which I have found this species recorded is that by Mr. Schwarz, of Florida Coleoptera.

Hornii Bv. One specimen.

Hypocoelus frontosus, Say. One specimen (given to Dr. LeConte).

Sarpedon scabrosus, Bv. One specimen of this very rare species was taken by me while beating shrubbery (June, 1880), and another was captured about the same time and given to me by Mr. Fletcher. Both were ♀, this sex having been previously unknown. They are now in the respective collections of Drs. LeConte and Horn.

Elater nigrinus, Payk. One specimen. Recorded from Michigan and Lake Superior.

**Megapenthes stigmosus*, Lec. This species is by no means rare, yet I do not find it in any of the lists which I have at hand, except that of Lake Superior species.

Agriotes oblongicollis, Mels. Rare; same localities.

Limonius aeger, Lec. Rare. A Lake Superior species.

**Corymbites vernalis* Hentz. This pretty species is some seasons quite common on the flowers of Choke-cherry, and is also found on those of Hawthorn.

**fallax* Say. Captured by beating oak, etc. Occurs with *Oxygonus obesus*, which it much resembles, but which may be readily distinguished by the elytra being spinose at tip.

**cruciatus* Linn. (=*pulcher* Lec.) This handsome beetle is taken occasionally upon Beech, and it is probable that the larvæ live in the decaying trees.

BUPRESTIDÆ.

The species of this family, as of the preceding one, are well represented here, and the individuals of some of them are very abundant.

**Anthaxia inornata* Rand. I find no record of this species in any of my lists, so that it must be rare. Three or four specimens have been taken here, but unlike *viridicornis* and *viridifrons* (which occur abundantly on various trees in June and July), it appears early in the spring, and is found on such flowers as Trillium.

Chrysobothris floricola Gory. One specimen. The species is recorded from Buffalo, Lake Superior and Florida (rare), so that it is widely distributed.

pusilla Lap. The only mention I find of this pretty little species is in LeConte's "Revision of the Buprestidæ of the United States," 1859, where it is given as from the "Middle and Southern States. Rare." Only one specimen taken by me; date not recorded.

* *Sexsignata* Say. Rare.

* *Agrilus interruptus* Lec. Rare. Occurs at Buffalo.

putillus Say. One specimen of this diminutive species, which I find also recorded from Michigan.

Sp. ? A specimen easily distinguished from any other small species by its less elongated form. I was informed by Dr. Leconte that it was unknown to him, and Dr. Horn states that the species is not in his cabinet.

LAMPYRIDÆ.

Podabrus nothoides Lec. ? My determination of this species is by Dr. Leconte's "Synopsis of the Lampyridæ of the United States," where it is described as a new species, occurring in Mass. and at Lake Superior. Rare.

MALACHIDÆ.

Malachius Ulkei Horn. Three ♂ specimens captured while beating bushes. Dr. Leconte, on seeing these beetles, considered them to belong to a new species, but Dr. Horn, on examining one, immediately recognized it as belonging to the above species, which was founded by him upon a specimen from Dakota, loaned by Mr. Ulke, in whose collection it now is. With the exception of *M. æneus* Linn. (an introduced species in the Eastern States) the members of this genus were formerly considered peculiar to the Western fauna, being found chiefly in California. I now find that there is a specimen in the collection of the late Mr. Billings, labelled "*Anthocomus lateralis*," making four specimens (♂) from this locality. The female yet remains to be discovered.

PTINIDÆ.

Hemiptychus punctatus Lec. Rare.

Dinoderus punctatus Say. Rare.

SCARABÆIDÆ.

The species of this interesting family are not numerous in these northern latitudes, nor are the individuals, except of the commoner species, in any way abundant.

Aphodius hyperboreus Lec. A dead specimen (♀) found floating on the South Nation River at Casselman. The species was described by Leconte in Agass. Lake Sup., p. 225, and occurs from Lake Sup. to Oregon.

CERAMBYCIDÆ.

Phymatodes thoracicus Muls. I am indebted to Mr. Fletcher for a pair of these longicorns, which I believe are an introduced European species. Mr. Fletcher was fortunate enough to obtain several of them from an old wine-cask.

Callidium aereum Newm. I am also indebted to Mr. Fletcher for a fine specimen of this beetle taken upon pine at Hull.

* *Purpuricenus humeralis* Fab. This handsome beetle is already recorded from Canada, but from what localities I have not been able to find out. In the classification of Leconte and Horn it is stated to occur in the Middle and Western States. None of the lists which I have contain it, so that it must be comparatively rare. I was

therefore much pleased to capture a pair last summer. The ♂ was taken near Rideau Hall on 27th June ; the ♀ on Sparks Street in the centre of the city, on 11th July.

Microclytus gazellula Hald. is also a species belonging to the Middle States, and is given in my Michigan and Buffalo lists. It is an elegant little beetle with the ant-like form and movements of *Cyrtophorus verrucosus*, which it closely resembles. Only three specimens found, on Hickory and on Sumac flowers in July.

Leptura saucia Lec. This Leptura occurs on flowering shrubs, and is the smallest species which I have taken. It is rare here, and is not given in any of my lists.

Monohammus maculosus Hald. A fine ♂ of this species was captured late in September three or four years ago. As it resembles pretty closely the very common beetle, *M. confusor*, I thought I might have overlooked specimens previously, but a careful watch since then has not revealed any. It is recorded from Lake Superior.

Goes pulverulentus Hald. This fine insect is rare on Hickory during July. Occurs also at Buffalo.

Leptostylus parvus Lec. One specimen of this rare beetle.

Liopus punctatus Hald. Rare, only three captured. Neither this nor the preceding species is included in any lists to which I have referred.

Saperda mutica Say. On the 15th July, 1882, I captured a pair of these prettily marked beetles on decaying willows. It is recorded from Buffalo.

(To be Continued.)

THE SURVIVAL OF THE FITTEST AMONG CERTAIN SPECIES OF PTEROSTICHUS AS DEDUCED FROM THEIR HABITS.

BY JOHN HAMILTON, ALLEGHENY, PA.

The ultimate extinction of many species of Coleoptera in the vicinity of large cities is unquestionable, especially of the larger Carabidæ. The conditions of life with some are such as admit of no adaptation to the methods of civilization, and for them no refuge from the encroachments of agriculture will eventually remain. They are now retiring, retiring, and

in time the last goal will be reached. In localities where the population is becoming dense, and all land available placed under cultivation, many fine species that once were common are now rarities and others fast becoming so. It is less than half a century since Mr. Randall described eighty four species from localities in Maine and Massachusetts, most of them common; but, according to Mr. Austin, in the same places several of these species are now extinct and many of them have become rare. The Coleopterist of Cincinnati, or of Buffalo, of a couple of hundred years hence, who shall be fortunate enough to possess one of Mr. Dury's, or Mr. Reinecke's lists of local Coleoptera, will no doubt have occasion to mourn over the absence from his Fauna of many of the choice forms there registered. And, by the way, the value of local catalogues would be greatly enhanced by indicating the comparative abundance of the individuals and other matters, as is done by Mr. Schwartz in his "List of Species Collected in Florida."

The foregoing is preliminary to a consideration of the probable future of several species of Pterostichus of wide distribution occurring here, as deduced from their respective habits of life and powers of adaptation. The references are to this locality only.

1. *P. adoxus* Say occurs commonly eastwardly of the Mississippi and northwardly from Tennessee and Carolina. Here it is moderately abundant, being usually found under the bark of fallen timber, or under chips and stones in its vicinity. The larvæ probably live about decaying wood. This species is not likely to become entirely extinct.

2. *P. rostratus* Newm. has the same range as *adoxus*, extending further south. It is much less abundant. It seems to have similar habits. Here it is about extinct, only three specimens having been taken in ten years; but fifty miles south-east, along the base of the Allegheny Mountains, it is not uncommon.

3. *P. diligendus* Chand. occurs from Virginia to Canada, eastward of the Mississippi. It is very abundant here, and, from its habits, will likely survive. It is found in many of the ravines on hill sides formed by springs, following them to their origin, and when found on low ground it is owing to their having been brought down in freshets. It is a moisture lover and is never found in dry places. Its larvæ live in the banks of these hillside rivulets in ground that is constantly damp.

4. *P. honestus* Say is not often found here, and then either under the bark of fallen timber in wet places, where it probably feeds on small

cryptogams, or in certain kinds of woody fungus. Not much can be said about it, but it will probably become extremely rare.

5. *P. obscurus* Say is now a rarity. It appears to be a delicate species, totally incapable of any adaptability to change of surroundings. It is found in the woods under stones, near the top of hills, in places where the soil is light and friable. It must soon disappear from this Fauna.

6. *P. stygicus* Say will be a beetle of the future, having adapted itself to a great variety of conditions. It is equally at home in field or forest, in the river flats, or on the mountain tops. It is common in nearly all the Northern States.

7. *P. relictus* Newm. is not a common nor an abundant species. It occurs occasionally in the valleys among the hills, in wild places, under chips or stones, but more frequently on the rugged, sloping banks of ravines, where the soil is light and friable without much moisture. From the nature of its habitat it may long exist as a rarity, unless the beetle hunters of the future should become so numerous as to destroy the plant.

8. *P moestus.* This large and graceful species is now moderately common, being usually found in open woodland about wood in process of conversion into humus, in which it probably oviposits. In time it can scarcely fail to become rare, as its beauty will cause it to be much sought for, and its habitat become more and more limited. Those who desire to have it with the rich purple of its elytra intact, should never place it in æther or in alcohol, which transmute this color to black.

9. *P. Hamiltoni* Horn occurs usually on plateaus on the sides of hills, where there is a dry friable soil with herbage and timber. It is mostly found under flat stones, generally from two to four together, and makes little effort to escape capture. It has only been discovered here in two limited localities, and its annihilation is only a question of time. Forty miles south it appears to be abundant, probably extending along the base of the Alleghenies into Maryland.

10. *P. Sayi* Brulle, living as it does in low ground and among rank vegetation in places subject to inundation, will survive.

11. *P. Lucublandus* Say is ubiquitous. Having, like *stygicus*, great powers of adaptation, its future is assured.

12. *P. luctuosus* Dej. oviposits under drift on alluvia along rivers and their influents, and will probably continue more or less abundant. This, and species with a similar habitat, can scarcely be altogether exterminated,

for, should they disappear for a time, re-colonization by river transportation can scarcely fail to occur.

13. *P. corvinus* Dej. The mature insect is found under rubbish and decaying vegetation in and around swampy places. The larvæ live in the swamp and may be found full grown about the beginning of June. They are entirely luteus except the mandibles, which are brown and very powerful. The head is as large as the first thoracic segment, and the outline of the larva is fusiform. Each abdominal segment has at the sides three long appendages. As there are only a few swampy places in this vicinity, and these all susceptible to drainage, extinction is a matter of course.

14. *P. purpuratus* Lec. This handsome species is common here, though generally it must be rare, being always in demand. Its habitat is plateaus on hill-sides and along the base of rugged elevations, where there is a dry light soil and some low vegetation, as *Nepeta glechoma*, *Stellaria*, *Claytonia*, *Dielytra Canadensis*, etc. Agriculture is its enemy, and its beauty will induce the beetle hunters of the future to pursue it to extermination in the few places to which it must finally retreat. Alcohol changes the purple of its elytra to black.

15. *P. mutus* Say will survive. It seems to be a progressive insect; though preferring its native woods, it is becoming, so to speak, domesticated, gradually accommodating itself to cultivated places. There is a marked difference between those bred in fields, for, presumably, four or five years, and those taken in their native haunts. The former are on the average larger, have the base of the thorax more coarsely and densely punctured, and the elytra more deeply striate and less polished. So different in appearance are the extremes, that, by destroying intermediate forms, they might be separated into species.

16. *P. erythropus* Dej. is a hardy species, though not very abundant; and, as it inhabits in high or low ground, whether cultivated or in a state of nature, it is likely to be long a surviver. The individuals found here have the feet piceous black, while those of New Jersey and Massachusetts have them bright ferruginous, the typical color; otherwise no difference is observable.

The sixteen species above mentioned are all of the genus now occurring here. Their survival in this Fauna, as deduced from the foregoing, may be thus summed up. Four must soon become extinct. Six may

possibly exist in the future as rarities. Four *(diligendus, Sayi, luctuosus, mutus)* will occur not uncommonly, while two *(stygicus* and *lucublandus)* will remain, as now, common.

It may not be out of place to remark that with two exceptions, the individuals of these species do not vary notably from a certain type belonging to each ; and that these two, namely, *stygicus* and *lucublandus*, are the ones that possess the greatest power of accommodation. *Adoxus* varies in regard to the posterior angles of the thorax, but all the individuals of each locality conform to one type, so far as observed.

So far as known, none of them are in any way injurious to man, or to vegetation ; and in the absence of such a record, may be set down as beneficial, owing to the carnivorous habits of the larvæ. In fact, except as to their mere existence and the mode of distinguishing them by external anatomical differentiation, entomological literature is silent.

THE ENTOMOLOGY OF VANCOUVER ISLAND.

Notes on Eighty Species of Hymenoptera Collected near Victoria, Vancouver Island, in 1882.

BY GEORGE W. TAYLOR, VICTORIA, B. C.

All the insects mentioned in the following notes were captured by myself during the season of 1882, which was my first year in this island, and were taken for the most part on flowers in the course of my rambles. Some of the Ichneumons, however, were bred from the pupæ of Lepidoptera, and a few species were taken at rest, at light, or in other more or less usual ways.

The eighty species here enumerated have been examined and determined for me by Mr. W. Brodie, of Toronto (to whom I am much indebted for this and other kindnesses), and they are therefore nearly all of them included in the check list issued last year by the Natural History Society of Toronto. In fact, the only names that I do not find in that list are *Halictus lævipennis* and *Eurra albitarsis*, but they may perhaps be there under other names which in my ignorance of synonymy I fail to recognise.

Both species and specimens of Hymenoptera appear to be very numerous here, and a large collection might soon be amassed by any one with time and inclination to work at it; but as I stated in a previous paper, I do not possess either of these qualifications, and my labors in British Columbian entomology will be probably confined, I fear, to the laying of a very slender foundation on which future workers may build.

It will be noticed that some common Eastern species are also abundant here, for instance, *Vespa maculata*, the three ants, *Trichiosoma triangulum*, the two *Pimplas*, and some dozen others, but, as might be expected, the majority of our Vancouver insects are of a distinctly Western type.

It would perhaps have been wiser to have waited until I could have identified all my captures, as I have now over two hundred species, and have published a more complete list and with fuller notes, the present being little more than a list of names; but on the other hand, facts in science cannot very well be put on record too soon, and if we wait to perfect our work, we may have to wait a very long time.

I have sent to Mr. Saunders, for the Ontario Entomological Society's Collection, a box containing duplicates of some of the under-mentioned species, and in process of time will, all being well, forward others. In this way I hope that the insects will come under the eyes of many entomologists learned in this particular branch, and if any such gentleman should detect error in their naming, I shall be exceedingly obliged if he will communicate his corrections to me.

The arrangement followed in these notes is that of the Check List alluded to above.

HYMENOPTERA.

Apidæ.

1. *Apis mellifica* Linn. Abundant in the usual domesticated state.
2. *Bombus centralis* Cress. Only one specimen captured, but it may nevertheless be common.
3. " *Vancouverensis* Cress. Very common.
4. " *occidentalis* Greene. "
5. " *lacustris* Cress. "
6. " nov. sp.? A few specimens were taken of a *Bombus* which Mr. Brodie considers probably new. I will, however, defer description until after further investigation.

7. *Apathus elatus* Fab. Not rare.

Andrenidæ.

8. *Andrena hilaris* Smith. A few only, on flowers.
9. " *hirticeps* Smith. " "
10. " *miserabilis* Cress. Abundant.
11. *Halictus coriasceus* Smith. A few only.
12. " *ligatus* Say. Common.
13. " *discus* Smith. Common.
14. " *albitarsis* Cress. Common.
15. " *lævipennis.* This name does not appear in the Check List, but the insect so named by Mr. B. is remarkably abundant. There are numerous other species of *Andrena* and *Halictus* not yet determined, some of them being very plentiful.
16. *Colletes thoracica* Smith. Not common.
17. *Osmia lignicola* Prov. Not common.
18. *Megachile brevis* Say. Abundant, resting very often in the burrows made by *Buprestis lauta* Lec.
19. " *mendica* Cress. Also very common.
20. *Ceratina tejonensis* Cress. Rare.

Vespidæ.

21. *Vespa maculata* Fab. Only too numerous, building enormous nests of more than a foot in diameter. I suppose it is equally abundant in the eastern provinces.
22. " *media* Oliv. Common. The suspended nests of this wasp are very noticeable in early spring.
23. " sp. A species which Mr. Brodie could not determine. It is of the size of *V. media.*
24. " sp. Another *Vespa* which may be a new species. It is exceedingly abundant and remarkably savage. The sting, too, is more than ordinarily painful. Its nests are subterranean, and the racoons evidently consider the comb a favorite morsel. These animals probably destroy the greater number of nests before the close of the season, and if it were not for this check, I am afraid the insects would soon become an intolerable pest. Being so common here, I shall be pleased to send a long series to any Hymenopterist who will send me a box.

Eumenidæ.

25. *Odynerus blandus* Sauss. Very common.
26. *Eumenes globulosus*, Sauss. "

Crabronidæ.

Owing to my desultory mode of collecting, I have not taken many species of this family. The only one I have named is

27. *Cerceris deserta* Say., which is not uncommon.

Nyssonidæ.

28. *Gorytes laticinctus* Prov. Common.

(To be Continued.)

CORRESPONDENCE.

AN INSECT ATTACK ON AN IULUS.

Dear Sir: A friend—a careful observer of insects and their ways, although not an entomologist—has communicated to me the following statement:—

"Once, and once only, and that many years ago, I saw what seemed to my uneducated eye, a swarm of minute gnats making an Iulus unhappy. He was hastening as fast as his numerous legs could carry him across a wood road—they hovering over him, darting on him, and he stopping and biting at them angrily, and then moving on. It seemed to me that they were puncturing him. Were they ichneumons? If not, what were they?"

I would be glad to learn if any similar occurrence has ever been observed, or if any plausible explanation can be offered for so singular an insect demonstration. I am not aware that parasites ever make a combined attack in the manner above described.

Albany, May 13, 1884. J. A. LINTNER.

CHANGE OF ADDRESS.—W. F. Kirby, from 5 Union Road, Tufnell Park, London, N., England, to 2 Burlington Gardens, Chiswick, London, W.

A. W. Putman Cramer, 51 Douglas St., Brooklyn, N. Y., wishes to exchange Canadian Noctuidæ and Geometridæ for Lepidoptera of the world, and would be glad to correspond with any one desirous of making such exchanges.

(February, '84, No., published April 16, '84.)
(March, '84, No., published May 16, '84.)

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., MAY, 1884. No. 5

NOTES ON BUTTERFLIES, WITH DIRECTIONS FOR BREEDING THEM FROM THE EGG.

BY W. H. EDWARDS, COALBURGH, W. VA.

I am asked to write for the CAN. ENT. a paper on breeding butterflies, and on taking observations of the larval stages, and I comply with pleasure, hoping that what I shall say may be the means of inducing some collectors to cultivate this field. There are many local collections of butterflies in Canada and the United States, and a few general North American collections, more or less complete. But their owners are mostly satisfied with mere collecting and accumulating specimens of the imago. Very few know anything of the larval and other stages of the butterflies, unless of some of the common species. And where anything is known, very little is given to the world. Some collectors, however, have also been breeders of butterflies, sphinges and moths on a large scale. As for example, our friends, John Akhurst and Professor Julius E. Meyer, of Brooklyn, each of whom could fill a good-sized volume, if they would relate one half of what they know on these subjects. Such an one was the late William Newman, of Philadelphia, who lived to a good old age, and had spent his spare hours for many years in collecting and breeding lepidoptera. But none of these gentlemen have published a line that I am aware of, and the entomological world is not much the wiser for their private experience. So that practically here is a great field almost unworked. Even in Europe, very little systematic work has been done in this department with the butterflies. Apart from mere collecting, I do not see that anything of consequence remains to be done, either in North America or Europe, with the butterflies, except to study their life-histories. Both continents have been well explored, and only now and then can a new species be found. One collection is pretty much the same as another. To be sure, there is the anatomy of the butterfly or of the larva, but to study that requires special training, and this few have the inclination or the facilities for acquiring. But the study of the life history requires no

special training. Any one can take it up and follow it with a pleasure that rapidly becomes absorbing. Especially to dwellers in the country, or to those who spend some weeks in summer in the country, is this to be commended. And to any one who needs a hobby, the collecting of butterflies and breeding them from the egg, will give the physical and mental exercise they seek. A few days ago, a wealthy man, retired from business, in one of our cities, driven to despair from mere inaction, shot himself, in the fear that he would go mad. And one of the daily papers improved the occasion to preach the importance of hobbies, whether it be the raising of cabbages, or collecting pictures or china, or the study of archæology or of natural history. A man mounted on his hobby "does not suffer from vain regrets of his past career. He has found something more absorbing, more elevating, more pleasing. His hobby suffices him, gives him an interest in life, and prevents his nerves from preying on his health." I knew of a lawyer who at sixty was ordered by his physician to find some employment out of doors which would occupy his time and thoughts, unless he wished to be speedily gathered to his fathers; and he conceived the idea of making a collection of limestone fossils, as they were abundant in the region in which he lived, though hitherto he had known nothing of fossils or of natural history. And this he followed with delight for years, chiselling out the beautiful fossils as laboriously and skillfully as if stone-cutting had been his trade, studying them and arranging them in cabinet. He lived twenty happy years after that change of base, and left a collection which is famous for its magnitude and value. And, on the other hand, we have all known men who in the prime of their mental and physical strength have retired from active business, and have died from sheer vacuity of mind, after twiddling their thumbs in an arm-chair a few years, who might have reached four score if they had some hobby to ride. So I commend butterflies to elderly gentlemen or retired gentlemen in need of an occupation. The young need no recommendation. It is always enough to show them the way in any branch of natural history, and they follow it with ever increasing enthusiasm. Studies of this description keep young people out of mischief and old people out of the grave, and that is one good reason for cultivating natural history.

And now to our subject. Most female butterflies lay eggs readily in confinement, if shut up with their natural food plant. What that is cannot always be known, but it is well to try plants which allied species feed on. In most cases allied species feed on the same group of plants. Thus

Phyciodes *Tharos* eats any sort of Aster, and so will Melitæa *Harrisii*. I had larvæ of Eresia *Texana* sent me from Texas, and offering them Aster, they took to it forthwith. Mel. *Chalcedon*, in California, feeds on Penstemon, Scrophularia, etc., but larvæ sent me readily eat the leaves of *Chelone glabra*, on which M. *Phaeton* feeds here. So, in case of doubt, it is best to try such plants as allied species feed on. What these are may be learned from the books, in many cases. Mr. Scudder, in 1869, drew up a list of food plants of butterflies, for the American Naturalist, and I have very often had occasion to refer to it. So, the same author, in "Butterflies," 1881, gives a list. Scattered through the volumes of the CAN. ENT. is much information of the same character.* Sometimes there is no clue, and more or less experimenting is necessary. In CAN. ENT., vii., 161, 1875, Mr. Mead relates his discovery of the food-plant of P. *Tharos*, "which had baffled all my endeavors for the past four or five years, during which I have tried a great number of plants without avail." He relates that he prepared a large box by filling it partly with earth, and transplanting into it specimens of all the common compositæ he could find. The box was covered with gauze and about a dozen females of this butterfly were introduced. "In a few days I examined the leaves and found six patches of eggs upon one of the plants. The plant proved to be a species of Aster." Then he transferred some of the females to a box containing Asters only, and further eggs were obtained. After that, I bred *Tharos* by hundreds, one season after another, and got at its complete life-history.

In 1881, I received from Arizona several eggs and just hatched larvæ of Lemonias *Nais*. The eggs had been laid on Mesquit, and I had no idea what they would eat here. But quite a number of sorts of leaves were given them, among them peach, cherry, wild plum, and after nearly all the larvæ had died from starvation, it was found that the survivors were eating the plum. So of the larvæ received I was able to get one example to pupa and imago on plum. Mr. Scudder wrote me: "You have filled one of the greatest voids in our knowledge of the biology of butterflies," as little or nothing had till now been known of the history of any species of the Lemoniadæ.

Some species eat but a single plant, or sub-group of plants, as P. *ajax*,

* As soon as I can find time, I will draw up a new list of the food-plants of butterflies, and send to the CAN. ENT., and I should be glad to receive information from any one who has any knowledge of this matter.

the Pawpaw, Asimina; P. *Philenor*, species of Aristolochia (though, according to Scudder, *Polygonum convolvulus*, or knot Bindweed). On the other hand, some species are almost omnivorous, as P. *Turnus*, which is credited with eating plants in a score of genera. P. *Asterias*, and its allies, *Brevicauda*, *Machaon*, etc., feed exclusively on Umbelliferæ, carrots, fennel, parsley, etc. The Pieridæ feed on Cruciferæ, cabbage, turnip, radish, horse-radish. The Coliadæ on clover, pea, lupine, astragalus. Callidryas and Terias on Cassia. Danais on Asclepias. Argynnis on Violet, though A. *Idalia* also on a species of Aster. The Graptas on nettle, elm, hackberry (Celtis), currant, gooseberry, false nettle (Boehmeria); Apatura on Celtis; Limenitis on willow, hawthorn, aspen and poplars.

Our species of Lycæna, so far as known, on a variety of flowers, as *Pseudargiolus*, in its several forms, on dogwood, rattle-weed (Cimicifuga) and Actinomeris; *Scudderii* on lupine and on Jersey tea (Ceanothus). *Comyntas* on clover, blossoms and leaves. *Melissa* on Astragalus. Thecla larvæ I know very little about, the only one I ever saw being that of *Henrici*, which feeds on the inside of plums, wild plums, excavating the whole interior of the fruit. But many species are said to feed on leaves of oak: *Melinus* on hop, thorn, etc., F. *Tarquinius* on hawthorn. The Satyrids all feed on grasses and sedges. So Pamphila feeds on grasses and sedges; Nisoniades on herbaceous plants and shrubs.

Wherever I have lived in the country, as at Newburgh, New York, for several years, and later, at Coalburgh, W. Va., I have brought into my grounds all trees, shrubs and plants, on which larvæ of butterflies are known to feed, so far as I could get them. So that I am pretty certain to have food of almost any species close at hand. Thus, in addition to plants from the region around Coalburgh, I have Astragalus, Amorpha and Scrophularia from California, aspens from the Catskill Mountains, and even a particular nettle from the north, for V. *Milbertii*, which I found last year starved to death on our native nettles, *Milbertii* being an exotic species here.

Now, the plant supposed to be known, we wish to get eggs of butterflies laid on it. If a tree or shrub, I use a bag or bags of Swiss muslin, but mosquito netting often, especially for large butterflies, as Papilios. For Papilios, the bag is about 30 x 18 inches. For medium sized species, as Graptas, say 18 x 10; for Lycaenæ, 10 x 6, having always on hand several sizes. If there is any reason for keeping a particular female

separate, of course, put but one in the bag; otherwise several, as half a dozen *Turnus*, for example. One can judge pretty well, either by the size of the abdomen, or by the worn state of the wings, whether the eggs are mature. If the wings are worn, even though the abdomen be not swollen, it is probable the butterfly has already laid most of her eggs. Species differ in regard to the time required after impregnation for laying. Several have been known to lay within a few hours after the two sexes had been taken in copulation, but others require several days. In these last cases the eggs are not fully formed when the butterfly comes from chrysalis, in the other they are. In Argynnis *Myrina* and A. *Bellona*, also in P. *Tharos*, the eggs are mature in the new butterfly; in Mel. *Phaeton* they are wholly unformed. In the larger Argynnids about two weeks elapse after emergence from chrysalis before the eggs are mature. In many species copulation takes place as soon as the female comes forth, often before the wings are expanded or dried. Indeed, in Heliconia *Charitonia*, the males have been observed by Dr. Wittfeld to hang in clusters of four or five upon the female chrysalis, and when the shell bursts open from their weight, one of them is sure to make connection before the shell is fully removed. I have seen old males of P. *Ajax* coursing up and down a bit of woods in which these butterflies were coming from chrysalis, and ready to pounce upon any limp-winged female that came within their vision. In CAN. ENT., viii., 161–2, I related that I turned loose at Coalburgh a dozen examples, male and female, of A. *Myrina*, the larvæ of which I had brought from the Catskills, and about three hours later found a pair of them in copulation in the grass. These I got into the house and into a box, and next day set the female on a plant of violet under a bag. Within an hour she had begun to lay eggs, and within two days laid 93.

In August, 1877, I took a pair of Arg. *Atlantis* in copulation, in the Catskills, in the forest, several miles from home, and doubting if I could get them home in this condition, I tied up my net and suspended it to a branch. The next day I returned and brought in the female, which laid fertile eggs at two days and later.

Some species, however, do not seem to lay so readily as Argynnis, and have to be kept alive artificially in the manner to be described hereafter. Often, and especially for species which lay on small plants, as violet or grasses, I set the plants in pots, or even tin fruit cans, and over the tops tie bags, which are high enough to clear the plant by a few inches. To

keep the bag upright and well expanded, put three sticks in the earth at an angle. Argynnis readily lays so ; also all species of Satyridæ which I have tried ; so Pamphila. The eggs will be laid on the plants, or on the bag, and more or less on the ground. A good method also is to confine the butterflies in a large box, which is covered with a cloth. In the box either plants in pots may be set, or the plants may be rooted in earth. I prefer the former way, however, as when eggs are dropped on the earth in such circumstances, it is almost impossible to find them. Arg. *Diana* and *Cybele* lay freely in this sort of confinement, and I have generally used the box with them. They lay a good deal on the sides of the box, as well as on the cloth, but many eggs will be found on the leaves and stems of the violet. Mr. Mead varied this mode with Limenitis *Arthemis*, with excellent results, as he relates, CAN. ENT., vii., 162 : "A notch is cut in the side of any empty wooden box, through which a branch of willow or other appropriate food-plant is passed, care being taken to select a leafy spray, so as to partially fill the box with foliage ; it is then covered with gauze, tacked fast on one side, and part way down on the adjoining sides, that on the fourth side being held down by a piece of wood fastened to the remaining flap of gauze. This renders easy the examination of the contents at any time. Now a saucer of raw dried apples, sugared, and partly filled with water, is put in, and the cage is complete. Butterflies like L. *Arthemis* will live in such a vivarium for two weeks and more after their capture, and appear to enjoy the food provided immensely, laying many more eggs than if enclosed in a bag and allowed to perish of hunger and thirst." Mr. Mead says that in such a box 15 females laid over 500 eggs. I saw this lot at the time, and eggs were all over the willow leaves and the cloth. The limbs of willow were turned down as they grew, and into the box, this being placed on the ground by the brook. So where butterflies are confined in boxes with plants in pots, sugared fruit of any sort may be given. Or when a bag is tied over a pot, a small tin box with similar food may be set on the earth within the bag, and the butterflies very soon discover it.

So a glass jar may be used for small species, and I have often obtained eggs of Pamphila by this means, setting a stem of grass with its root in the jar. Mr. H. W. Nash obtains the eggs of Colias *Hagenii* in this manner ; also L. *Melissa*, without trouble. All that would seem to be necessary is that the plant should be apparently a growing one, to induce the butterfly to entrust her eggs to it.

I have often obtained eggs from Lycaena *Comyntas*, which lays on clover, or from Colias *Philodice*, on same plant, by tying a bag over the stem as it grew when in blossom, setting a stick in the earth to hold the bag upright. It is here necessary to shade from the sun, as a very short exposure to the direct rays of the sun will kill the butterflies. So in all cases where bags are tied to branches, care must be taken in this respect. It is well to pin paper over the bag, in the direction of the sun, or a piece of cotton cloth. But on account of ants, it is better to have the plant in pot, rather than in ground, and at all events, the eggs should not be left out over night where ants can get access to them. Spiders perhaps are more destructive than ants. Better bring the butterfly into the house, and tie it out again next day.

Many butterflies lay their eggs in clusters, as do the Melitaeas, from a dozen to an hundred in one patch; or Apatura to two hundred and more. The Graptas lay their eggs in strings, or singly; in the former case as many as 7 or 8 standing in a vertical column. G. *Interrogationis* often lays many eggs on one leaf, but not exactly in cluster, and the young larvæ gather into a loose colony. P. *Atalanta* lays a single egg on the topmost leaf of a nettle, or Boehmeria, and the young larva, as soon as out of egg, makes itself a shelter by weaving together the edges of the leaf. P. *Huntera* lays single eggs on species of Everlasting, and the young larva protects itself very much as does the larva of *Atalanta.* According to Mr. Scudder, Am. Nat. x., 611, P. *Cardui* lays single eggs on thistle leaves, and the young larva makes a sort of nest of bits of leaf woven together. Vanessa *Antiopa* lays its eggs in cluster around the small stem of a willow, and the larvæ are gregarious to the last. But most butterflies lay their eggs singly, one egg on a leaf, and often but one egg to the plant. Of all our Papilios, *Philenor* alone lays in a cluster, a dozen or 20 eggs in rows touching each other, and the larvæ feed in rows around the edges of their plant till at least half grown.

Certain species in larval stage are highly gregarious, as *Antiopa* already mentioned. So are the Apaturas. The fall brood of A. *Clyton* and A. *Celtis* hibernate after 3rd moult, and gather in a dense cluster on the under side of a leaf of their plant, heads and tails, as close as they can pack. On 21st Sept., I found 165 larvæ of *Clyton* so collected on one leaf. These Apaturas are unprotected by web. Limenitis *Disippus* and other species spend the winter in cases cut out of the leaves they feed on, one larva to one case, and fitted as nicely as a tailor would fit a coat

to his customer. Several of the Melitaeas, as *Phaeton*, *Harrisii*, etc., live in colonies within a close web of their own construction, enlarging as their growth makes it necessary; and when the time for hibernation approaches, the web is made doubly strong. So they pass the winter, and come forth in early spring to separate somewhat, and henceforth live without shelter. So the species of each genus differ in their larval habits, and sometimes species of the same genus differ materially.

Eggs of some species hatch in three and four days, as Grapta, Colias, Pieris, and in many cases the entire period from the laying of the egg to pupation is not over a fortnight, and to imago not over three weeks. I received eggs of Agraulis *Vanillæ* from Georgia, and from hatching to chrysalis, 4 moults being passed, the period in some cases was 10, in others 12 days, the pupal period 5. Probably the egg stage was not over 4 days, which would make the entire round from laying egg to imago, 19 to 21 days. The Papilios hatch in from 4 to 6 days; D. *Archippus* the same; M. *Phaeton* about 20; P. *Tharos* 4 to 7; P. *Nycteis* about 12; Limenitis *Disippus* 5 to 8; Arg. *Diana* 15; *Cybele*, *Aphrodite*, *Alcestis*, *Atlantis* 15 to 20; A. *Myrina*, *Bellona* about 6; the large Satyrids, 14 to 28 days; the Neonymphæ, about 8 days; Libythea *Bachmani*, 4; Lycaenæ, 4 to 8; Lemonias *Nais*, about 12; Pamphila *Huron*, 4; N. *Lycidas*, 4.

The only butterflies known to me to hibernate in the egg stage are the Parnassians. The eggs are laid on Sedum in July and August, and probably the larvae come forth in the spring. At any rate, eggs of P. *Smintheus* and *Clodius*, obtained by Mr. Mead and kept in the house, gave larvae in mid-winter, or late in the winter. But the larvae of P. *Apollo*, in Switzerland, are said to come from egg late in the fall, and the larval stage to be the hibernating one. Certainly the larvae of the American species have a different habit, and the hibernation is in the egg. By keeping *Smintheus* eggs on ice through early winter of '83–'84, I retarded their hatching till 30th Jan. The eggs had been kept in an ice house at Dayton, O., but in January, as my own ice house was now filled, I sent for them. After their arrival, there being no sign of hatching, I left them on a shelf out of doors, in the shade, and forgot them. Some days after, the mercury being 55° at noon, I looked at the eggs and found some hatching. I put them at once on ice, and a few days later, the weather being pleasant, I brought them out again, and in less than a week the larvae were all hatched. I fed them on Sedum (abundant here on rocks),

and succeeded in getting several larvae past 1st moult, and one past 2nd, but all died. The stages were very tedious, and the longest lived larva reached about 40 days from egg. I think if I had let the eggs stay in Ohio two months longer, I might have got some of the larvae to imago.

It will be seen then that eggs may in many cases be sent on long journeys. Even the eggs of such species as hatch in 3 to 5 days may be sent from Maine to Coalburgh, or from Florida, or from Colorado. But if placed in glass tubes or bottles, or in tin boxes, and sent by mail, with leaves of the food plant, a journey of 6 to 12 days may be ventured on. The eggs of L. *Nais*, from Arizona, were 12 days in the mail and the larvae were in part just hatched when they reached me. I had 60 young larvae of C. *Eurydice* come last month from San Bernardino, Cal., corked up in a 2 oz. morphine bottle, which was inside a tin case. The plant, *Amorpha Californica*, in the bottle was perfectly fresh, and the larvae, as hatched, had fed on it. So Dr. Wittfeld, from Indian River, Fla., has repeatedly sent me eggs in tin, which have been out 6 to 10 days. Generally the larvae have hatched on the way, but the plant has kept fresh. The only trouble I remember has been with cruciferous plants, mustard, radish, etc., or with passion-vine. These do not bear the journey, but are apt to come decayed. But experiment has proved that such plants keep well in a corked bottle, even in the hottest weather. Eggs ought never to be sent in a wooden or paper box. Apart from the danger of a crush in the mail bag, the plants dry up and larvae will starve. Nor should cotton ever be laid with the eggs or among the leaves. The young larvae get entangled in the cotton, and the leaves will dry up the sooner for the presence of the cotton. There are several species of eggs of Canada butterflies that I should exceedingly like to get, as Grapta *J-album*, Grapta *Faunus*, Argynnis *Atlantis*, Lyc. *Scudderii*, L. *Couperi*, Pieris *Virginiensis*, Colias of any species, except *Philodice*, F. *Tarquinius;* and I shall be very much obliged to any person who will send me these or any of them.

Mimicry—I recently observed an interesting instance of mimicry in the Phalænid moth, *Tetracis lorata* Grote. While examining the flowers of a bed of May apples *(Podophyllum peltatum)* I found one of these white moths adhering to the stamens of a flower, its head towards the center and the wings being easily mistaken for the petals. By a little search another was discovered in exactly the same position.

Clarence M. Weed, Lansing, Mich.

THE ENTOMOLOGY OF VANCOUVER ISLAND.

Notes on Eighty Species of Hymenoptera Collected near Victoria, Vancouver Island, in 1882.

BY GEORGE W. TAYLOR, VICTORIA, B. C.

(Continued from page 80.)

Sphegidæ.

29. *Sphex apicalis* Harr. Very common on flowers, especially in July.
30. " *elegans* Smith. " " "
31. *Ammophila communis* Cress. Also very common later in the year.
32. " *conditor* Smith. " "

Formicidæ.

We have seven or eight species of *Formica*, but only the three following have been examined by Mr. B , and so I will insert no others in the present list. They are all abundant.

33. *Formica herculanea* Linn. The winged form is to-day (May 12) flying in countless numbers in the sunshine.
34. " *Pennsylvanica* De Geer. Very common.
35. " *fusca* Linn. Very common.
36. *Myrmica incompleta* Prov. I have taken but one or two specimens of this insect.

Chrysidæ.

37. *Chrysis cærulans* Lepell. Only one specimen.
38. *Hedychrum violaceum* Lepell. Very abundant.

Chalcidæ and *Cynipidæ.*

I have entirely neglected these families so far.

Braconidæ.

39. *Bracon obliquus* Prov. Two males in June.
40. *Macrocentrus mellipes* Prov. Rare, July.
41. *Phylax pacificus* Prov. Very common in the early spring.
42. " *niger* Prov. " "
43. *Platysoma tibialis* Prov. One specimen only in July.

Ichneumonidæ.

Very numerous. I have nearly 40 kinds in all. The following are those already determined.

44. *Ichneumon cœruleus*, Cress. One only, flying in August.
45. " *otiosus* Say. My only specimen was unfortunately destroyed during the process of examination.
46. " *insolens* Cress. One specimen bred from chrysalis of *Vanessa cardui.*
47. " *seminiger* Cress. A few only.
48. " *segnax* Cress. Very common; one specimen was bred from the chrysalis of a *Lycæna.*
49. " *longulus* Cress. Very common; most of mine were taken at rest on apple trees in October and November.
50. " *varietus* Cress. Also common.
51. " *Vancouverensis* Prov. This fine insect is abundant, and I have bred it in some numbers from the pupa of a *Bombyx.*
52. *Amblyteles suturalis* Say. One only.

Cryptidæ.

53. *Phygadeuon crassipes* Prov. Several specimens during July and Aug.
54. " *subspinosus* Prov. " " "
55. " *attenuatus* Prov. " " "
56. *Hemiteles crassus* Prov. Common, July and August.
57. *Cryptus rufoannulatus* Prov. One female in May.
58. " *robustus* Cress. Not uncommon.

Ophionidæ.

59. *Ophion bilineatus* Say. Very common during summer and autumn, frequently taken flying to light.
60. " *nigrovarius* Prov. A single specimen returned with this name has unfortunately been destroyed.
61. *Anomalon nigrum* Prov. Several bred from pupæ of Noctuæ.
62. *Limneria valida* Cress. July.
63. " *genuina* Say. Common. A few bred from small cocoons found on bracken.
64. " *flaviricta* Cress. Common in spring.
65. " *compacta* Prov. One or two, May and June.

Tryphonidæ.

66. *Mesoleptus fasciatus* Prov. Several in July.
67. *Tryphon communis* Cress. Several, July and August.

Pimplidæ.

68. *Coleocentrus rufus* Prov. One female at rest on a fence, 31, 7, 82.
69. *Pimpla indagatrix* Walsh. Not rare. June.
70. " *conquisitor* Say. Not rare. Spring.
71. *Theronia rufescens* Cress. Numerous. Several bred from pupæ of *Orgyia*, in September.
72. *Ephialtes occidentalis* Cress. A few flying in sunshine, June and July.

Uroceridæ.

I have six species of these splendid insects. Two have been determined as follows:

73. *Urocerus flavicornis* Fab. Common in autumn.
74. " *caudatus* Cress. A single female only of this small species.

Tenthredinidæ.

Cimbicinæ.

75. *Trichiosoma triangulum* Kirby. Tolerably common, as are also its cocoons.

Tenthredininæ.

Samples very numerous. Some kinds sadly too numerous, but I have not yet collected very many species.

76. *Dolerus sericeus* Say. Exceedingly abundant, particularly in June, on flowers of Dog Daisy.
77. *Selandria halcyon* Harr. One or two only.
78. *Euura albitarsis.* One or two only. This is apparently absent from the check list.
79. *Allantus originalis* Nort. Exceedingly abundant with *Dolerus sericeus*, on Dog Daisy flowers.
80. *Tenthredo mellina* Harr. Common in spring.
81. " *rufopedibus* Nort. Common in spring.

THECLA NIPHON.

BY JAMES FLETCHER, OTTAWA, ONT.

About the middle of May, 1883, Mr. A. W. Hanham took a ♀ *T. Niphon* a few miles from the City of Ottawa. This was the only specimen at that time seen.

On the 4th May last, when walking along the Chelsea Road, near the village of Chelsea, P. Q., with Mr. Harrington, he called my attention to

a small butterfly which had just alighted on the bare road in front of us. This I was delighted to recognise as *Niphon*. Having no nets with us, a too near approach was only rewarded with the mortification of seeing the coveted prize flit lightly up to the top of some high pine trees. Subsequent to this date the weather was cold and wet for some time, and I had no opportunity to visit the locality until the 22nd of the month. On this date the Ottawa Field Naturalists' Club organized an excursion to the Chelsea Mountains for the purpose of entertaining the Fellows and Delegates of the Royal Society of Canada, and consequently we were honored with the presence of our worthy President, Prof. Saunders, who happened to be in Ottawa attending the annual meeting of the Royal Society. As we passed the locality for *Niphon* on the way, the attention of all was directed to the pines as we passed. It was the President's experienced eye which detected the first examples; three beautiful tempting specimens were seen flying round the top of a white pine about 30 feet from the ground and well up out of reach; but none were obtained.

Two days later, however, Mr. Harrington, Mr. Ami and I went out again armed with a net attached to a long bamboo. Fortune favored us at last. On the way out one female which had settled on the road was taken. When we reached the grove of white pines *(Pinus strobus)* where the three specimens had been seen two days earlier, Mr. Harrington climbed up to the top of the same tree and took two more, all in good condition. Bordering the pine grove was a field in which a great deal of the herbage was made up of *Antennaria plantaginifolia* in flower, and along the edge of this field, close to the trees, nine more were taken and two others seen. Highly elated at our success, we turned our steps homeward with twelve perfect specimens, eight ♀ and four ♂. Two days later I again re-visited the locality and met with a great disappointment. The day was intensely hot and butterflies were very plentiful. On arriving at the field I saw with delight *Niphon* three or four at a time in every direction, but my chagrin was great when on taking them one after another, I found there was hardly a presentable specimen amongst them. The locality is on the top of a hill, and for the past two days high and boisterous winds had prevailed, and this must have been the cause of their tattered state. Altogether, although a hundred could have been taken with ease, not a dozen were found worth collecting. Nevertheless, I boxed some females alive with the object of getting the eggs, and have succeeded in getting thirteen. Under the microscope they are objects of

great beauty. The shape is round with a deep depression at the summit, almost half the depth of the egg. The general color is pale green, and the surface is beautifully reticulated, the lines of the coarse netting being much raised above the surface and almost white. This gives the egg the appearance of having a white bloom on it. One egg laid on 26th May gave the larva to-day, June 5th.

The larva has already been described by Mr. Saunders, CAN. ENT., I., p. 95, and is also figured by Townend Glover in his plates of Lepidoptera, Plate B, fig. 8.

Among the specimens of the perfect insect I captured, I found there was considerable difference in the marking and beauty of the upper surface, particularly among the females. I imagine the typical colors of this sex to be a rich ruddy bronze with a green sheen, and having a black border running round the margins of the wings. This border varied much in depth; it was sometimes almost restricted to the fringe of the wings, while in others it covered about one-fourth of the surface. These dark specimens are very handsome. There is also much difference in the size of the white bars in the fringe. The under side of both sexes is very similar and varies very little. The general color of the ♂ is slaty black with in some specimens the green sheen seen on the females. A few specimens of the male had a reddish tint in the black, and a few examples had indistinct bronze eye marks where the tails are found in other species of this interesting genus. The flight of this insect is very quick and jerky, and when disturbed it often flies off to the tops of trees. When visiting the flowers of *Antennariæ* for honey, it has a curious habit of slowly moving its lower wings while closed alternately up and down. The tails found in other species are represented in this one by a curve in the margin by which the long fringe gives the appearance of a little tuft of down when the wings are closed. I have about a dozen specimens to spare, which I shall be glad to give to any members of the Society who will send me a box for their transmission.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The annual meeting of the Entomological Club of the American Association for the Advancement of Science will be held in a parlor of the Hotel Lafayette, Philadelphia, commencing at 2 p. m. Wednesday,

September 3rd, 1884. The entomologists in attendance at the Montreal meeting, 1882, authorized Mr. J. A. Lintner, should he think best to do so, to call a meeting at Minneapolis, 1883, to consider the advisability of reviving the Entomological Club. The meeting was held pursuant to Mr. Lintner's call, and after discussion it was decided to continue the meetings of the Club under the rules previously adopted. Officers were elected, and several profitable sessions were held during the continuance of the American Association meeting. In accordance with the rules the Club is called to meet the day before the opening of the general meeting. Entomologists who desire to read communications are requested to notify one of the undersigned as early as August 15th.

O. S. WESTCOTT, Secretary, Maywood, Ill.

D. S. KELLICOTT, President, Buffalo, N. Y.

PRIONUS BREVICORNIS, FABR.

BY FREDERICK CLARKSON, NEW YORK CITY.

These beetles were very abundant at Oak Hill, Columbia Co., New York, during the months of July and August, in the several years of 1875 to 1882. Harris states that the larvæ feed on the trunks and roots of the Balm of Gilead and Lombardy Poplar. Oak Hill is a part of the old Manor of Livingston, and is notable for the variety and age of its oaks. Upon the lawn immediately in front of the dwelling are two ancient trees of the black oak variety, one of which is supposed to be two hundred years old. From the roots of these old trees these beetles would emerge during the first two weeks in July, usually appearing just after sun-down, or in the darkness preceding a shower. During the sun-light, the closest observation of the short cut lawn skirting the trees, would not reveal a beetle, but so soon as the sun rested behind the towering Catskills, these revellers of the twilight and the darkness would come forth. Their presence is quickly realized by the odor of the ♀, which is very powerful, and can readily be detected twenty feet distant. I placed a ♀ immediately after emergence in an uncovered jar, and wherever I positioned it, on the piazza or elsewhere, the ♂'s were attracted from every direction. I captured twenty ♂'s in a very few minutes. Oak Hill cannot boast of a Balm of Gilead or a Lombardy Poplar, but it is famous for its oaks, and while it is admitted that the former trees, as mentioned by Harris, serve as food for the larvæ, my observations indisputably prove that they feed also upon the roots of the oak.

CHANGE OF ADDRESS.

Our old friend, and much esteemed correspondent, Wm. Couper, late editor of the *Canadian Sportsman and Naturalist*, has removed to Troy, New York. His address is 114 Fourth street, Troy, N. Y. His many friends and correspondents will please note the change. Mr. Couper was one of the earliest observers and writers on insects in Canada, and has added much to our knowledge of insects and their habits. We are sorry to lose from among us so old and faithful a worker, and wish him much prosperity. He carries with him his love for insects and his long acquired habits of observation to his new field of labor. In the letter announcing his removal, written May 12th, he says: "The weather has been very cold for some days past and I have not seen many insects on that account, I have, however, noticed that *Hyperchiria Io* Fab. is extremely abundant on the lilac. I could have collected three or four thousand cocoons from bushes in one garden in this city."

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 73.)

CHRYSOMELIDÆ.

My collections in this extensive family contain over ninety species, of which several are yet undetermined. The great similarity of the species in some genera and the variation in form and color of individuals in other groups render their determination difficult.

Donacia pubescens Lec. This species is readily distinguished by the dense pubesence of the upper surface, which in our other species is of metallic lustre. It was described from a specimen taken by Dr. Le Conte at Smoky Hill river, while on the W. Pac. Ry. survey between Kansas and New Mexico in 1867, (Trans. Am. Ent. Soc. Vol. II, pg. 55.) It has since been recorded from Michigan and Buffalo. Four or five specimens taken by Mr. Fletcher in a small swamp near the city, in 1878.

jucunda Lec. This beetle is apparently not rare—it is given in the Lake Superior and Michigan lists.

Zeugophora abnormis Lec. One specimen; 14th June.

Cryptocephalus badius Suffr. One specimen on foliage of *Carya amara*, 24th July. Middle and Southern States.

Pachybrachys femoratus Oliv. Taken on young pines, about the end of July, near Hull.

Galeruca 6-vittata Lec. Two specimens in June. Has been found at Buffalo.

Disonycha caroliniana Fabr. This species is apparently rare in the immediate vicinity as I have only found two ; one under a stone in May, where it had probably hibernated, the other taken on a beating net on 28th July. At the South Nation river, however, near Casselman, about thirty miles southward, I found it quite abundant last summer (23rd June), feeding upon the narrow leaf dock (Rumex verticillatis.) There appears to be some confusion, this (or another) beetle in Canada, as in the lists of the Entomological Society a label is given for "*D. Caroliniana* Oliv.," while the recent lists of the Toronto Nat. Hist. Soc., do not contain the species.

BRUCHIDÆ.

Bruchus cruentatus Horn. One captured and another seen. A pretty and very active little beetle, having a wide but more southerly range, and stated to be everywhere rare.

TENEBRIONIDÆ.

Strongylium terminatum Say. Two specimens.

MELANDRYIDÆ.

The species of this family, unlike those of the preceding one, are well represented in Canada, and the individuals of some are among the most common of our fungus-eating beetles.

Hypulus n. sp. ? Among some beetles given to Dr. Le Conte, was one which he indicated in a list afterwards sent to me, as a new species. "with deep thoracic impressions." The specimen having been incorporated in his large collections it will be now impossible to identify it or to say whether it was a new species.

*(*Mystaxis*) *simulator* Newm. Two specimens.

MORDELLIDÆ.

Mordella irrorata Lec. Rare. Recorded from Michigan but belongs rather to the middle and Southern States, and is given as not rare in Florida.

Mordellistina aspersa Mels. Several specimens taken on flowering plants, such as Spiræa, about the end of July. This beetle is stated by Mr. John B. Smith (Trans. Am. Ent. Soc., Vol. x.,) to be "the most common of our species." It cannot, however, be very abundant northerly, as it has never apparently been recorded from Canada, nor is it in Lake Superior, Michigan or Buffalo lists.

Comata Lec. Two or three specimens ; varying in color of head and thorax to the forms *picicornis* and *cervicalis* Lec., now included by Mr. Smith in this species. Recorded from Michigan under the latter names, and Buffalo under the last one.

pectoralis Lec. Rare. A prettily marked species taken by Leconte on the north shore of Lake Superior (Agassiz Lake Superior Expedition.) Evidently rare, as Mr. Smith, in his remarks on the species, states that he had seen only one specimen and that the type, nor can I find mention of its capture elsewhere. This is one of many instances in which a marked resemblance of the fauna of Ottawa to that of Lake Superior is evident.

ambusta Lec. *Var.* Two specimens. Recorded from Michigan, but is more abundant in the Middle and Southern States.

ENTOMOLOGICAL NOTES.

BY A. W. HANHAM, PARIS, ONT.

I have to record the capture of some Coleoptera in rather an unusual manner. Last week while out in the woods on one of my collecting tramps, I was attracted to an old stump by the glittering of something in the sun. Closer acquaintance did not at first solve the mystery; the bright object seemed to be buried among some debris. Further examination revealed the dried and withered remains of a small toad, the glitter being that of some Buprestidæ partly exposed in what was once the stomach of the defunct batrachian.

I carried the remains home, and with no little trouble excavated in a perfect state the following :—

Calosoma frigidum Lec.

Platynus placidus Say. Several.

Dicerca ? A pair.

A small weevil unknown to me.

Portions of *Cicindela repanda* Dej., other Coleoptera and some Diptera.

From the above list it would seem that toads can hardly be called useful, seeing that such a large proportion of their food—if we take this one for a standard—consists of decidedly beneficial insects. I will allow that they are very desirable tenants for the owners of gardens, but in the woods they must be formidable rivals to the entomologist. This year they have been unusually abundant, and the rarity of many of our beetles is no doubt caused by their rapacious appetites.

I have not taken *C. frigidum* before ; the *Dicerca* is also new to me. I find it very difficult to determine my captures, and a serious obstacle to taking satisfactory notes. I am indebted to W. H. Harrington, of Ottawa, for the naming of a considerable number last winter. *C. calidum* Fabr. also seems to be quite rare here ; I made special search for it this spring and found but one specimen. I took another on October 27th last year, from the heart of a decaying log. Is it double brooded in this part of Ontario ? Or would it be possible for one attaining the perfect state in June to live through the summer and survive the winter ? The specimen I captured in October had evidently prepared to hibernate. On June 15th, I found under stones on dry ground a pair of *Calosomas* which are entirely new to me. I expect though I could name them from the Society's collection in London.

I should have been surprised to find so large and active a beetle as *C. frigidum* falling a prey even to the biggest of toads. The Buprestidæ must also be rather tough morsels for them to digest. It will ever remain an open question as to whether " our departed friend " lost its life through its own greediness, or met a violent death at the hands of one of its many foes. I have read of some ardent collectors who secured many rare beetles by capturing and killing the toads they found in their rambles.

CORRESPONDENCE.

Dear Sir : As I am working out the *Phycidæ* and *Galleridæ* of the whole world, with the view of publishing a monograph of these families, I shall be very happy to receive boxes of Canadian and any other *Phycidæ* and *Galleridæ* to name for any of your correspondents. I only desire that when possible two or three specimens of each species may be joined to the consignment in case I should not possess the species. I will send European *Microlepidoptera* in return if desired. My monograph will comprise twelve plates, containing upwards of two

hundred and sixty species (eight are already prepared), besides two or three plates with details of neuration, etc.

E. L. RAGONOT, Banker, 12 quai de la Rapee.
Vice-President of the Sociéti Entomologique de France.
Paris, France, June 4, 1884.

INSECTS SWARMING ABOUT IULUS.

Dear Sir:—The following observation may have a bearing on the facts communicated by Mr. J. A. Lintner to a late number of your paper. (See Can. Entom., April 1884, v. 16, p. 80.) Several years ago I found a large living *Iulus* surrounded by a swarm of minute Diptera, apparently similar to the species that often breeds abundantly in stale lemonade and similar mixtures. Whether the Diptera I observed were really *Drosophilidæ* or not I cannot say, because I did not examine them carefully. I saved specimens of the flies, but they have been lost. At the time that I saw them I supposed that they were attracted to the *Iulus* by the odorous fluid secreted by its lateral glands—a fluid that is quite acid—and I afterwards thought that it would be an interesting experiment to expose a specimen of *Iulus*, after irritating it thoroughly to cause it to pour out some of its secretion, in a cage out of doors, to see if these flies would not be attracted by its acid fluid. The *Iulus* which I saw in the midst of these flies did not appear disturbed by them, although they darted up and down about him, often lighting in numbers upon his back.

GEORGE DIMMOCK, Cambridge, Mass.

Dear Sir: While walking along the New Jersey shore of the Delaware River, near the village of Delanes, last July, I was startled by hearing some small bodies falling through the foliage of an oak tree, and as they struck the leaves it sounded as if it were raining, but as the sky was perfectly clear, my curiosity was aroused. I turned around to see what the noise was, and saw some black larvæ falling to the ground, and further investigations showed that quite a number of these larvæ had fallen to the ground from the tree, and here and there I saw several Tachina flies, I believe a species of Exorista, hovering around the larvae trying to deposit their eggs. From this I suppose that these Tachina flies had flown to the tree in search of victims, and most probably the larvae had dropped from the tree to escape their enemies. Perhaps many larvae take this method of trying to escape from their Hymenopterous and Dipterous parasites?

EUGENE L. KEEN, Philadelphia, Pa.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., JUNE, 1884. No. 6

ENTOMOLOGY FOR BEGINNERS.

BY W. HAGUE HARRINGTON, OTTAWA.

NOTES OF A JUNE RAMBLE.

My office duties prevent me, unfortunately, from going afield during almost the entire month of July in each year, and perhaps a few notes on my last ramble, 29th June, may interest the inexperienced, and indicate some of the insects to be found at this time. The special aim of this ramble was to visit a grove of hickories, *Carya amara*, and investigate the insects occurring in these trees, but I desired also to obtain Coleoptera and Hymenoptera, especially sawflies.

My outfit consisted of a flat beating-net constructed so as to be folded up snugly when not in use; a sweeping-net on a folding pocket-ring; a bottle containing coarse sawdust, with a morsel of cyanide for beetles; a wide-mouthed bottle lined with blotting paper, and having some cyanide in a cavity in the cork, for Hymenoptera, Diptera; a couple of boxes for larvæ, and last, but not least, a note-book and pencil. The day is favorable, the sun shining hotly, yet tempered by a slight breeze. My first capture is a half-grown Cimbex larva under an elm tree in the city, and in passing through the lumber yards I obtain *Buprestis cousularis* and *Dicerca tenebrosa*. Along the river are seen many Neuroptera, including some fine species of Phryganidæ and Perlidæ. On the sides of a railway embankment (I am now in the Province of Quebec) grow a variety of young trees and other plants. The willows are first tried and yield very abundantly, *Diachus catarius* and *auratus*. Less numerous are *Monachus soponatus*, *Anomœa laticlavia*, *Agrilus torpidus?* and A. *fulgens*. I am pleased to capture a fine pair of *Saperda mutica*, as I have only hitherto taken them once. Among other beetles are *Trichalophus alternatus*, *Rhynchites cyanellus* and *Chrysomela multipunctata*, with larvæ of the same. On some trees a sawfly larva, yellow, hairy, with

rows of black spots, is very abundant, and there are also larvæ of lepidoptera, including one of a Catocala. The raspberry bushes, which a few days ago were alive with bees and wasps, are now almost deserted, but the wilted tips of many of the young shoots show that some enemy has been at work. It is found that a foot or so below the top they have been neatly girdled by two rings about half an inch apart, and that between these rings has been inserted into the pith a long cylindrical egg, that of *Oberea bimaculata*. From a small balsam poplar is obtained *Saperda moesta*, and an examination discloses the larvæ of different sizes in gall-like swellings, about an inch or two apart, along the shoots which are not half an inch in diameter. Near the root, where the stem is somewhat stouter, is found a much larger borer, which is apparently that of some moth. The hickory grove is now reached, and the first tree yields a fine *Saperda discoidea*, a very rare beetle here. From other trees the following beetles are abtained: *Dorcaschema nigrum*, *Liopus alpha*, *Lepturges querci*, *Leptostylus macula*, *Hyperplatys aspersus*, *Anthaxia viridicornis*, *Agrilus egenus*, *A. otiosus*, *A. bilineatus* and *Balaninus rectus*. Several tree-hoppers occur in various stages, including *Telamona unicolor* and *T. fasciata*. There are also some large flat half-grown bugs (yellow, with blackish markings,) one of which has killed a luna caterpillar about an inch long, and is sucking out its juices. The caterpillars of this moth are quite common, but generally smaller than the one mentioned, and a few larvæ of other moths are seen. Three specimens of the pretty little butterfly, *Thecla calanus*, are observed flitting about the trees, or settled upon the foliage. Space will not permit to mention the various galls, etc., which disfigure the leaves more or less. Scattered through the grove are a few oaks, some of which have the foliage noticeably disfigured by large globular woody galls placed upon the mid-rib of the leaf, which is much distorted and curled up. From these galls are just emerging small hymenopterous flies, with ample wings, of which I do not know the name. Some of the leaves are being devoured by brownish caterpillars, half an inch long, with a black head and a pair of black spines projected forward from one of the thoracic segments. They feed side by side in rows of five or six and eat the leaf from the tip downward. Upon these trees are found also the beetle *B. rectus*, which was upon the hickory, and which is remarkable for its extremely long and slender snout. Flying about through the grove are lovely butterflies, *Limenitis arthemis*, fresh evidently from chrysalis and almost persuading one to be a lepidopterist.

Descending now into a meadow, through which flows a sluggish brook, I fold up the beating-net and screw the sweeping-net into its handle, which hitherto has been only used to tap the branches with. The stream is bordered with clumps of alders, willows, etc., between which grow luxuriantly ferns and many herbaceous plants, with sedges and various grasses. Magnificent fritillaries are hovering about the blossoms of the milkweed, which are just beginning to open, while numbers of *Neonympha Boisduvalli* flit about with a peculiar jerky flight. Beetles do not appear to be as common as they sometimes are here, but I take several specimens of *Scirtes orbiculatus*, three species of fireflies and several allied beetles, with several species belonging to the other families, as Coccinellidæ, etc. Three or four kinds of sawfly larvæ are found but none of the perfect insects are seen. Two, or perhaps three, species of Chrysops are unpleasantly numerous, but are not nearly so aggressive as I find them in a pine wood, through which I return. This wood rings with the shrill music of the cicada and is enlivened by many butterflies in the more open portions, where other trees and plants occur. My captures during the ramble are perhaps fifty species of beetles and a few Hymenoptera. This number is less than half of what I frequently obtain, but the value of collecting depends not so much upon the number of species taken, as upon the observations which are made upon the habits of the various species.

July 3rd, 1884.

OBITUARY.

It is with a feeling of sadness that we record the death of our esteemed friend and companion, Prof. Francis Gregory Sanborn, which occurred at the residence of a friend in Providence, June 5, 1884, by an overdose of chloral, taken to allay a nervous affection, from which he was a sufferer. He was born in Andover, Mass., Jan. 18, 1838. His father, Dr. Eastman Sanborn, was born in Sanbornton, N. H., and settled as surgeon dentist in Andover.

Francis was of slender health from infancy. From a diary kept by his mother it appears that when he was two weeks old his life was despaired of for many days. He was born a naturalist, and very early developed

powers of close observation, and patient study—especially in the branch of entomology—and the common forms of life about us.

Graduating from Phillips Academy in 1858, especially did he excel in Greek and Latin—receiving his instruction directly from the Principal, Mr. Taylor—which became so useful to him in pursuing his favorite branches of Entomology and Conchology, in which he became an acknowledged expert.

He went to the State House in Boston in October, 1858, when he was employed in the State Cabinet until 1865, when he was engaged by the Boston Society of Natural History in the departments of Entomology and Ornithology, receiving the appointment as regular assistant in 1867, which position he held until 1872. In 1872 he accepted a position as teacher of Entomology and Microscopy in the Bussy Institute, connected with Harvard College. During the spring and summer of 1874 he was an assistant in the Geological Survey of Kentucky, under Prof. Shaler. With other gentlemen of the survey, he visited about fifty caves, including Mammoth Cave, chiefly with a view to ascertain the variations in temperature, and the present and extinct forms of animal life. In 1875 he was employed by the Smithsonian Institution in arranging the coleoptera of North America for the Centennial Exhibition. This collection was shown in twenty-four large cases in the Government Building. Since then he has been engaged in museum work, arranging and labelling private cabinets, giving lectures before schools and clubs, on Entomology chiefly. Until 1882 he was employed as regular custodian in the Museum of the Worcester Natural History Society, which office he held at the time of his death. His work in museums, on private cabinets, and in arranging biological collections, giving on clear and distinct labels the history of the objects, making them plain and intelligible to the people, was one of the many things in which Mr. Sanborn excelled. He studied the common things of life—those which immediately surround us—and there was rarely anything in animal or vegetable life as to which he could not gratify an intelligent curiosity, and give a correct answer, and he delighted to do so. From a notice of his death in the Worcester Spy, we quote the following :

" He was ingenious, full of resources, remarkably ready and happy in communicating information to all inquirers ; of a cheerful, buoyant and uncomplaining temper, with the simplest tastes and habits ; he was a diligent student, an agreeable and unobtrusive companion. His death seems sudden and untimely, but it is certain that he himself, unworldly as

he was, would have regarded its approach with equanimity. The Natural History Society has lost in Prof. Sanborn its most important and valued helper. His presence will long be sadly missed by visitors to the museum, and his successor, whoever he may be, will not surpass the genial and helpful custodian, who, in his own quiet and unostentatious way, has done such solid and lasting service for the cause of popular science."

A careful and painstaking student, he contributed to science services of which others reaped the benefits. Dr. Harris' work, "Insects Injurious to Vegetation," owes much of its value to the patient labors of Professor Sanborn.

He was corresponding member of several entomological societies in the States, and Life Member of the Boston Society of Natural History.

T. A. D.,
Worcester, Mass.

ON VALGUS CANALICULATUS AND SQUAMIGER: ELLESCHUS BIPUNCTATUS, XYLORYCTES SATYRUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Valgus canaliculatus Fab. and *V. squamiger* Beauv., have, so far as I am aware, escaped the notice of American writers on Coleeptera, except that it is mentioned in the U. S. Agricultural Report for 1868, p. 90, that *V. squamiger* was found in great numbers in January, in Maryland, under the bark and in the rotten wood of a pine stump; and that Fitch gave some account of it, under the name *seticollis*, in his report for 1857, p. 695, which I have not seen.*

* Fitch's description is as follows :—

"BRISTLY-NECKED VALGUS, *Valgus seticollis* Beauv.—Beneath the bark around the crown of the roots of ant-eaten pine stumps, feeding upon the wood, fleshy, white, thick cylindrical grubs, resembling small larvæ of the May beetle, having three pairs of legs anteriorly and the body curved into an arch, its hind part being bent more or less inward under the breast, divided by impressed transverse sutures into twelve rings; the pupæ and perfect insects also occurring in the same situations; the latter short thick beetles about 0.28 long, the males chestnut brown, beneath black, the females dull black, both sexes with chestnut colored feet, and covered more or less with little ash gray scales, flattened upon their backs, their wing covers much shorter than the abdomen and

Having been described originally in Europe, and introduced, like many others, into our Catalogues uncharacterized, collectors here have to depend on tradition for a knowledge of the species. When recent and fresh there is no trouble in distinguishing them by differences in color and the arrangement of the scales ; but with age and abrasion these disappear in many individuals, and anatomical characters have to be resorted to.

Normally, *canaliculatus* is ferruginous, and has the elytra with feebly impressed striæ, the base, middle and apex being covered so densely with whitish scales as to produce a tri-fasciate appearance. The sides of the thorax are likewise densely coated with scales similarly colored. *squamiger* is darker, slate-colored, or blackish brown. The scales are narrower and more uniformly distributed, but condensed on the centres of the disk of each elytron, so as to form a small round white spot, often obsolete. The striæ of the elytra are scarcely traceable.

It is not necessary for our purpose to relate minor anatomical differences, as there is one easy of observation that can always be relied on to separate doubtful individuals, namely, the epistoma and clypeus.

In *canaliculatus* this is short, somewhat convex, slightly channeled in the centres, with a *deep notch or depression* at the middle of the anterior margin.

In *squamiger* the same part is prominent, somewhat broadly concave, with the anterior margin *rounded.* These curious little beetles occur here abundantly on flowers from April till July, and occasionally till late in autumn. They hybernate in colonies, in crevices of standing trees in process of dry decay, where I have several times found them in large numbers.

Elleschus bipunctatus Linn. This is an introduced European species, first brought to notice by Dr. Leconte, Proc. Am. Phil. Soc., v. 17, p. 621,

---

marked with rather obscure impressed lines, a broad shallow groove along the middle of their thorax, which groove is more deep anteriorly, and their anterior shanks with a row of about five little uneven teeth along their outer edge.

"In the month of April last, I met with sixteen of these beetles beneath the bark of a pine stump, slightly above the surface of the ground. The stump had been much eaten, by white ants apparently, the sap wood being all consumed and the cavity thus formed being stuffed with sand and dirt which had been carried up from the soil beneath, in which these insects were lying, torpid in their winter quarters, most of them crowded together in a heap in a single cavity in this dirt, the others scattered about in it singly, their larvæ having no doubt subsisted upon the decaying wood."—[Ed. C. E.]

without the specific characters. Detroit and Marquette are given as the places of its occurrence.

I find it here very abundantly in June on a species of small willow growing in upland thickets, and its identification I owe to the kindness of Dr. G. H. Horn. The genus in which it is placed is sufficiently defined under the name *Alyca* in the monograph of the Rhyncophora. The species is of easy recognition. It is about 2 mm. in length; the color at maturity is dark brown to black when deprived of vestiture; the elytra are finely striate, with the intervals wide and almost plane; the whole insect is densely clothed with a grayish, prostrate, scaly covering, easily rubbed off, which on the elytra is longer and hairlike. The insect takes its name from two black denuded spots on the elytra at the middle; they are shaped like a horse shoe with the convexity anterior, and are formed by two longer denuded parallel lines on the second and fourth striæ, united at the apex by a shorter one on the third. With age other spots are formed by abrasion, mostly near the base and apex, thus giving a tri-fasciate appearance. Specimens entirely nude would be difficult to determine, but fortunately for the collector, when found, the individuals are abundant.

Xyloryctes satyrus Fab. This large beetle is widely distributed, being found in Arizona, New Mexico, Texas, Kansas to Canada, and southward, and probably occurring wherever the ash and liquidambar grow. So far as known to me, but little has been written concerning it, and its life-history as given is mostly surmise. There is a wood cut of it in the U. S. Agricultural Report for 1873, with some remarks; and Mr. B. D. Walsh, Proc. Bost. Soc. Nat. Hist., v. 9, p. 287, states that the larvæ, which he briefly describes, live on the roots of grass.

In this latitude it emerges the latter part of June and beginning of July, and immediately resorts to the (white) ash, especially such as grow in open grassy places, at the roots of which it burrows, and may be taken in large numbers. The disparity between the sexes as to number is noticeable. On July 2nd fifty-five were taken at the base of a single tree, all of which were males except three. Thinking the females, as in some other species, would appear later, the same tree was again visited on the 10th, and forty-seven taken from the ground formerly dug over, thirteen being females.

Whether they eat anything is unknown, but being nocturnal, provided with well developed wings and having short, but sharp, toothed mandibles, it is probable they feed by night on the foliage of the ash. Certain it is they do not feed on the roots nor damage them in any way, and why this par-

ticular tree is selected, and for what purpose, is as yet unknown. Several times the eggs and young larvæ have been unsuccessfully sought for at the roots of the tree; and on the first of May this year a man was employed to dig at its roots; long trenches were cut in several directions, and to the depth of two feet, without finding larvæ or pupæ. The larvæ, which resemble those of Lachnosterna, but are distinguished by their "coal-black heads," as stated in the places above cited, are often found in grassy places, where I have also taken the beetle after disclosure. Now, since neither eggs, nor larvæ, nor pupæ, are found at the roots of the ash, and considering the comparative fewness of the females taken, Is it not probable that, after pairing, the latter resort to grassy places to oviposit?

At the place first cited is an extract from a letter from Mr. P. H. Foster, near Babylon, Long Island, who had a grove of over six thousand young ash trees, and from these it is stated his foreman dug up one bushel of these beetles, and that they had destroyed a number of his trees. The beetle itself is in this case certainly wrongfully accused, for it neither eats nor wounds the roots; but in case of small trees like these—"about eight feet in height"—the larvæ might have been so numerous in their vicinity as to have devoured the rootlets, by which nourishment is derived from the soil. Just what connection there is between the beetle and the ash and the liquidambar remains to be discovered, and it is to be hoped some entomologist residing in the country may be incited to a successful investigation.

Stridulation is effected in a manner I do not remember to have seen noticed, namely, by an arrangement within the acetabulum of the middle coxæ. This is very deep, and in the portion of the cavity belonging to the mesosternum is a large, polished, smooth space, divided by an acute carina; by rotating the coxæ the insect has the power at will to bring a certain part in contact with this carinated line, producing a shrill squeaking sound audible at a considerable distance. I have not succeeded in inducing them to come out of the ground to see what was going on, as narrated by your correspondent, vol. 12, p. 139.

To sum up, all that is now positively known of the life history of this bettle is, that in season it is taken burrowing at the roots of ash and liquidambar trees; that it exists in the larvæ state more than one year; and that some of its larvæ live on the roots of grass, and transform under stones, &c. All else is conjecture.

NOTES ON BUTTERFLIES, WITH DIRECTIONS FOR BREEDING THEM FROM THE EGG.

BY W. H. EDWARDS, COALBURGH, W. VA.

(Continued from page 89.)

The eggs of butterflies are very interesting objects. As a rule, those of each natural genus (I speak of the North American fauna, for I know nothing of the eggs of tropical butterflies), are closely alike, as in Pieris, Anthocharis, Colias, Terias, Callidryas; and so, while each genus has peculiarities of its own, there is a family resemblance between these genera (of the sub-family Pierinæ). They are all of one general shape, long, slender, sub-conic, or spindle-shaped, set on end, but differently ribbed according to the genus. So the eggs of Danais and Heliconia and Agraulis each have their own pattern. All Argynnis eggs, whether of the large or small species (Groups 1 and 2), are thimble-shaped. On the other hand, Euptoieta, by its egg, is allied to Argynnis, while by the chrysalis, it is allied to Melitæa. It links the two genera, and in my Catalogue of Di. Lep., I place it between these two, instead of before Argynnis, as has usually been the arrangement. So Melitæa, Phyciodes, Limenitis, Apatura, Paphia, Satyrus, Neonympha, Chionobas, may all be distinguished as readily by the eggs as by the butterflies. Lycæna, Lemonias, Thecla, Chrysophanus, so far as I know them, all show generic peculiarities in the egg stage. So does Papilio, though some of the species, as *Philenor* and *Cresphontes*, have the surface covered with a rough crust, the usual type being smooth-surfaced. Now Parnassius is ranked as belonging to the Papilionidæ and to the sub-family Papilioninæ, which includes the genus Papilio. And here alone among the American butterflies, so far as the early stages are known, is an anomaly. By the egg, Parnassius should stand near Lemonias and Lycæna, while by the chrysalis it is near the Hesperidæ or some of the Heterocera. By the caterpillar, it is widely separated from Papilio, having a resemblance to that genus in but a single character, the tentacles on second segment. So it is that I am confident that in a proper systematic arrangement of families and genera, where the preparatory stages were taken into consideration, Parnassius would stand near Lemonias.

The eggs of Hesperidæ are largely dome-shaped, either sub-conic or half a sphere; of the latter type is Ancyloxypha *Numitor*, of the former

most of the Pamphilas, and these last are usually smooth, but some, like *P. Napa*, are indented like a thimble. Of this shape also are the eggs of Megathymus and Pyrrhopyga *Araxes;* others are melon-shaped and ribbed, as Nisoniades and Eudamus, and the egg of Pamphila *Zabulon* (an abundant species of its genus), is of this type. Pholisora *Catullus* has a thimble-shaped egg, ribbed vertically and crossed horizontally by lines, while the top is curiously indented in rounded ridges. It looks much like a confectioner's jelly-mould.

Dr. Weismann, Descendence-Theory, English edition, shows that the larvae of butterflies in nearly all genera have a morphological congruence with the imagines. "The morphological congruence between larvæ and imagines declares itself most sharply in genera, where it is the rule almost without exception. In this case, we can indeed be sure that a genus or sub-genus founded on the imagines, will, in accordance with correct principles, present a corresponding difference in the larvæ," p. 444. This is just as true of the egg stage of the American species, with fully 150 of which I am acquainted. Therefore this congruence makes the study of the preparatory stages important. Until recent years, very little attention has been paid to this matter, and Dr. Weismann is the first author so far as I am aware, who has treated the larval and pupal stages philosophically. Whenever eggs are obtained they should be described from the fresh example, the form and markings noted down, and whenever possible they should be examined under a powerful microscope. By all means, if it is practicable, a drawing should be made on a greatly enlarged scale. Two or three of each species should be preserved in alcohol or glycerine for future reference. Probably glycerine is best, as eggs taken out of alcohol are apt to collapse when dry, and ribbed eggs, like those of Colias, sometimes change in shape in alcohol, expanding in diameter, with flattening of the ribs. Small glass tubes are better than narrow-necked vials for keeping examples of eggs or young larvæ. From these last it is rather difficult to remove objects.

Most eggs are green when laid, yellowish, as in Pieris, Colias, and many Papilios, bluish, as in Grapta, grayish, as in Limenitis. Lycæna has a deep green surface concealed by a white net work, but which can be peeled off. Parnassius is white, Pholisora *Catullus* is brown; the Hesperian eggs as a rule are white. Many eggs turn red a few hours after deposition, as Colias, Anthocharis. Mel. *Phaeton* turns lake-red. And all these, as well as most other species, change to black before hatching,

as the dark larva can be seen through the transparent shell. The larva eats its way through the top or side of the egg, and sometimes makes its first meal from the shell, devouring more or less of it. The larvæ which go into lethargy directly from the egg seem to eat nothing but the shell before they descend to the base of the plant and range themselves for a long sleep. In this way behave all the larvæ of the larger Argynnids, of the fall brood, when there are two broods ; so do the larger Satyrids, as *Alope*. Other larvæ hibernate after 2nd and 3rd moult, usually the 3rd, as the smaller Argynnids, *Myrina* and *Bellona*, Phyciodes, Melitæa, Apatura. Others hibernate at any stage where cold weather catches them, as Colias. Mr. Mead found hibernating larvæ of Colias under boards, in Illinois. In the arctic regions, the larvae of Colias never can reach chrysalis the same season in which the eggs are laid. Indeed, I do not see why larvæ might not be frozen for an indefinite period and come to life at last when weather was favorable. I have found that the best way to keep hibernating larvae in confinement alive through the winter months is to freeze them in the ice house, or in a snow-bank. The loss, after six months of this treatment, has been very light; whereas before I tried this method, very few and frequently no larvæ at all could be got through. They died from mould in the cellar, or from heat if in the house ; if out of doors, they moved about on warm days and perished from starvation. I have found small paper boxes excellent to keep them in, druggists' pill boxes. And these are set in a tin box and placed directly on the ice. The rough surface of the box allows good foot-hold to the larvæ, and the boxes have not moulded. I carried some 60 larvæ of M. *Phaeton* through last winter, and with them larvæ of Ap. *Flora*, all of which were half-grown, or past the third moult, with no loss to speak of. And Argynnids *Diana*, *Cybele*, Satyrus *Alope*, and other species, which hibernate direct from the egg, have been carried with trifling loss. And the later the larvæ are left on ice the healthier they seem to be. It is better to rouse them when the weather is settled and mild, than earlier, when violent changes of temperature will occur. Most larvæ pass four moults, but in case of hibernating larvæ, there is an additional moult. So that the summer brood of a species, as of Apatura, will have four, while the winter brood will have five, three before hibernating and two after it. Great care is necessary with the young caterpillars. Many species are apt to wander, and must be confined from the first, but others, as Limenitis, move very little, and may be trusted to remain always at

home, provided their food plant is kept fresh ; otherwise they certainly will wander. For convenience of observation, young Limenitis may be left on branches set in bottles of water, with no covering. So many Papilios move very little, resting in one spot for hours, but the larvæ of *Philenor* are particularly alert, and must be shut up. Most larvæ, in the younger stages, should not be touched by the finger or forceps, especially when they are near a moult. If it is necessary to change them from one leaf to another a bit of the leaf with the larvæ may be transferred, or the larvæ, if not near a moult, may be taken up by a camel's hair pencil. The habits of different species even from the moment they are hatched, are very interesting. Lyc. *Pseudargiolus* at once fixes itself on a flower bud of its food-plant, and bores a hole with its strong mandibles into the side large enough and no more to admit the head. The head is set on a long extensile neck, and the contents of the bud can be completely removed. According to Mr. W. G. Wright, the larvæ of Lyc. *Amyntula* eats into the pods of Astragalus, and lives on the young and immature seeds. The egg of Thecla *Henrici* is laid at the base of a flower stem of wild plum, and the young larva at once makes its way up the stalk and fastens on the young plum, boring into it just as the Lycaena bores into its bud, and till maturity eats nothing but the contents of plums, growing as they grow. Lemonias *Nais*, in confinement, stitched two leaves together and lined them with silk, came entirely out to feed and returned again to its nest. When about to moult, it closed the nest and was not seen for some days and till its new coat was fitted. All the species of Limenitis make perches by stripping bare the mid-rib of the leaf at the top. This would naturally curl up if left to dry, but the larva coats it with silk and stiffens it by binding on morsels of chewed leaf, and the perch remains straight. On this the larva rests the day long except when it goes to the leaf edge to feed, and feeding done it returns to the perch. This is the habit of the larva when first hatched, when its length is but one tenth inch, and the habit is kept up through the earlier stages. And connected with the perch is accumulated a little packet of scraps of leaf, just at the base of the perch, and as the substance of the leaf is eaten, the packet is rolled back so as to be kept pretty close to the cut edge. This rolling is done partly by pushing, what is gained at each effort being secured by threads, or successive threads are attached from the farther side of the packet to the edge of the leaf, and the thing is so turned over. After the second stage, that is, from 2nd moult, the packet is let alone,

and falls behind, as the perch lengthens. Now the object for which this packet is made, with all this labor, is yet unknown. These larvæ, when of the hibernating brood, in fall, make to themselves a close fitting jacket out of the leaf, snipping away here and there all superfluous parts till the pattern is cut out. Then the sides are drawn together by spun threads and held fast, and the whole interior is covered with a coating of silk. Moreover, the larva provides against the fall of its hibernaculum, by carefully weaving threads from leaf to stem and around the stem, so that the winds and storms of winter cannot possibly tear the case away. Now, the larvæ of the summer broods do not make any such cases, there being no need of them. Of all our larvæ, those of Limenitis show most of what in human beings would be called intelligence, working for a definite end, and varying their contrivances according to circumstances. Compared with them the larvæ of Argynnis, and Danais, and most other families are stupid. Paphia *Astyanax*, makes for itself a hibernaculum a good deal like that of Limenitis, but I have never had an opportunity of observing that species, and can give no description of its habits at work. Almost as intelligent as these case-makers, are some of the tent-makers, as Melitæa *Phaeton*, whose work is most finished of all its class. The eggs are laid in clusters of one hundred to three or four hundred, and the larvæ as soon as hatched knot their leaf into a nest the size of a small filbert. In course of the next two or three days they make a common web, taking in any leaf that lies convenient. As they grow they enlarge the web, all working for the common good. Especially, as each moult approaches, all wanderers come home, and the web is made tight, and into it they retire and pass the moult. Which over, the web is extended again; and so on, till finally when the third moult approaches, the web is often as large as a man's open hand made of closely woven silk, two and three coats of it, capable of resisting storms and all the wear and tear of winter. Up to this time a few holes have been left for egress, but at last these are closed up from the inside, and the larvæ are seen no more that year or after the third moult. If at any time from the hatching the web is injured by storms, the caterpillars forthwith set at work repairing, and do not rest, whether it rains or shines, till the work is done. And they have a prevision of storms and all hands may be seen working at their dwelling industriously, strengthening it here and there, even when the sky is clear, and there appears no reason for work. The food-plant is always in swampy places, often half under water, and the webs are beaten down by snow and rain, but the inhabitants get

through safely. When spring comes and the Chelone stems begin to sprout, these larvæ come forth and return no more to their old web. They now lie exposed to view on the plant, or on stumps, chips, fallen branches, enjoying the sunshine; pass two moults, and pupate. The butterflies are sluggish, but are not caught by birds, probably having some quality obnoxious to smell or taste, and the caterpillars seem to have a similar immunity. I accidentally discovered this season that they will bear considerable drowning, having left several in a glass of water for five hours. When I came back all were lying on the bottom of the glass, and I removed them to a piece of blotting paper under a tumbler. In another hour every one of them was crawling about, and they afterwards pupated. Melitæa *Chalcedon* makes a web in which it hibernates, much like that of *Phaeton*, but by the observations of Mr. Wright, it varies the nature of it according as the species lives in the valleys or at high elevation in the mountains. And in the valleys, the caterpillars go to ground to hibernate, while in the mountains they live in the webs.

Phyciodes *Tharos* is very near Melitæa *Phaeton*, and the eggs are laid in clusters, but the larvæ do not cover themselves with a web, but lie naked on the leaves, coming together and forming clusters when the moults take place.

The eggs of Apatura *Clyton* are laid in large clusters, 200 or more, and the young larvæ are highly gregarious but are not protected by a web. After the third moult, in the summer brood, however, they separate, each one living henceforth singly, and then it draws the edges of its leaf together and forms a loose case in which it is hidden. Apatura *Celtis*, on the other hand, is nothing like so gregarious as *Clyton*. The eggs are laid in clusters of 5 to 20, so far as I have observed, though in confinement the females may lay in one bunch 50 or more. But the larvæ after third moult scatter, and hide themselves as do those of *Clyton*.

Grapta *Comma*, in the larval stage, lives singly on the under side of a hop or nettle leaf, which it draws down till it becomes like the roof of a house, affording complete shelter from rain or snow. On the edges of this roof it feeds, and when the supply fails seeks another leaf. Grapta *Satyrus* has precisely such a habit. But the allied species, G. *Interrogationis*, lies naked on the under side of a leaf, with no effort at further protection, several larvæ often on one leaf. P. *Atalanta* is solitary from the start, the egg being laid on the terminal tuft of nettle or its other food plant. The young larva at once stitches the leaf together and lies in a

close case, This is shifted frequently as the larva grows, and affords food as well as shelter. Papilio *Troilus*, when it issues from the egg, proceeds to cut a slit at the edge of the leaf and folds down a bit thereof, stitching it closely; it lines the interior with silk and on this lies concealed, going out when forced to feed. This feeding is done at the upper end of the leaf, and when the shelter gets to be insufficient, another leaf is sought and treated in same manner. P. *Palamedes* has exactly such a habit. On the other hand, P. *Turnus* lies exposed to view on the upper side of a leaf, on a bed of silk, which forms a sort of bridge as the leaf is somewhat drawn together, permitting water that falls on the leaf to pass beneath it. The larva of P. *Asterias* rests on the stem of its plant entirely unprotected. The larvæ of Colias lie extended on the leaves, on the upper sides, along the mid-ribs, well protected by the resemblance in color to the leaf they feed on, clover or Astragalus, or Amorpha.

And so each species has its larval peculiarities which repay study.

I usually confine young larvæ, particularly when careful examination of them is desired, in glass tubes, and later transfer them to half-pint jelly glasses (tin-topped). These tubes are corked tight, and the leaves will keep fresh a long time in them. But they are usually examined once in 12 or 24 hours, and the larvæ removed to fresh tubes. The date of hatching is noted on a slip of paper, also the length of the larva, and this paper is pinned to the cork. Every morning a measure of length is taken and noted down. So the moults successively, and every moult is described, and all the changes set down in a note-book. If the larvæ are in a glass, a slip of paper is held down by the cover with all particulars written on it. Sometimes the individuals of a brood are kept singly through all their stages, but most often it is only necessary to watch for the successive moults, and to note the first and last larva to moult in that particular stage. The approaching moult may always be known by the swelling of second segment, and when any larva is observed in this condition it is separated from its fellows. While moulting injuries are apt to be received, which invariably result in the death of the larva, and therefore it is best to separate the subject to prevent disturbance from other larvæ. Many larvæ are cannibalistic, and if out of regular food and hungry, will devour their next neighbor without compunction; of this sort is P. *Philenor*. As I make alcoholic examples of each species at each moult, when possible, so I save the casts of faces at each moult for future reference and study, using small homœpathic tubes for this purpose.

Larvæ bear confinement in tight glasses well, and I often receive them from correspondents as distant as Florida, or California, through the mails, in good condition. The plants keep well in this sort of confinement also. I have never used what are known as "breeding cages," which are expensive if purchased, and are troublesome to make at home. The entomologists at the Agricultural Department, Washington, have large numbers of these cages, for all order of insects. The frames are of wood, about 18 inches high by 12 wide, one side opening on hinges. All the sides and the top are filled in with fine brass wire netting ; the top fits over like the cover of a bandbox, as it is often desirable to lift it off, and the whole thing rests on a tin base, so made as to hold earth, in case it is desired to have growing plants in the cage. So larvæ of Noctuinidæ, etc., may have earth in which to bury themselves. If the sides were not of wire, but of cotton netting, many species of larvæ would eat their way out, especially when about to pupate. On a recent visit at the Department, I could not learn the cost of such cages, but should suppose three or four dollars at least would be required for them. I found that the entomologists spoken of used tubes and glasses much as I have done for the younger larval stages ; also they tie bags of guaze over growing plants in flower pots, as I often do. The bag should clear the top of the plant and leave a few inches to spare, and it is held up and spread by three sticks set in the earth. In raising the large Argynnids, *Diana*, *Cybele*, etc., violets are planted in the pots, and the larvæ do well confined by bags in the manner described. As fast as the plant is consumed another must be substituted. These larvæ make no effort to escape, rest on the earth or on the sticks, and pupate from the top of the bag. So all Satyrid larvæ are easily reared in this way. I make constant use of tin pails with tin covers, one and two quart, for many larvae. Now, as I write, I have Grapta *Comma*, Melitæa *Harrisii*, Limenitis *Disippus* (nearly mature), and P. *Philenor* feeding in pails. They do perfectly well without light or sunshine. So do Apaturas, and in fact most larvæ. The food must be changed daily and the pails washed out and dried. As for large larvae, as of the Papilios, I generally use powder kegs (wood) or nail kegs, one or the other of which can be had anywhere. Remove the top hoop, and use the second one to bind down the cotton cloth cover; put a little earth in the bottom, and in it set a two quart glass fruit jar filled with water, in which branches of the food-plant are placed. No farther care is required than to substitute fresh branches for the old ones

as the leaves are consumed, and the larvæ will go on to pupation. This is when it is desired to get chrysalids by wholesale. So larvae may be left during several stages in bags or branches in the open, care being taken to protect them from the direct rays of the sun, or from the assaults of birds or other insects. This last may be done by a second bag outside the first, or by a screen of paper or cloth. But larvæ so treated must be brought in before they prepare for pupation, else many will eat their way out and escape.

But where observation of the larvæ is necessary, glass tubes and tumblers, and guaze-covered flower pots, and tin pails and nail kegs, will answer all the purposes of elaborate and expensive cages, and be more satisfactory, I apprehend. At any rate all my work is done in this way.

There are many northern species of butterflies, the history of which remains to be learned. Several species of Colias, *Interior*, *Occidentalis*, *Christina*, *Pelidne*; several Argynnids, all the boreal species, and most from the Rocky Mountains, also *Atlantis*, Grapta *Faunus;* and little is known of J. *Album;* the species of Erebia, Chionobas, Cœnonympha; nearly all the Lycænidæ and the Hesperidæ. I should be greatly pleased at receiving eggs or larvæ of any of the species mentioned, and would exchange larvæ of eastern species, or butterflies from any quarter for them.

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 98.)

ANTHICIDÆ.

Corphyra terminalis Say. This is a species with reddish thorax, which, from its representation in my collection, appears to be one of the commoner species of the genus.

Anthicus fulvipes Laf. On plants in low wet localities.

cinctus Say. Rare, under bark of old saw-logs, etc.

MELOIDÆ.

Meloe n. sp.? A very small ♂ found in early spring under a stone. It differed somewhat in sculpture and puncturing from *angusticollis* and *americana*, and also apparently in the structure of the antennæ, so that Dr. LeConte thought it might perhaps be a new species.

RHIPIPHORIDÆ.

This family contains a number of species formerly included in Mordellidæ, and of some the larvæ are known to be parasitic on Hymenoptera and Orthoptera.

* *Pelecotoma flavipes* Mels. On 30th July, 1882, I captured several of these rare beetles on an old beech tree at Chelsea, Que. They were all ♂ and were exceedingly active, running upon and flying about the dead trunk, and were very difficult to capture.

RHYNCOPHORA.

The remainder of my additions are included in this great division of the Coleoptera. The difficulty in the past of determining species has so shortened the lists of the families represented in Canada, that I find a large percentage of my named species to be unrecorded.

RHYNCHITIDÆ.

Rhynchites æratus Say. One, on hickory, 12th July.

CURCULIONIDÆ.

Apion herculaneum Smith. Three or four specimens. Occurs in Penn., N. Y., D. C., Mass.

Walshii Smith. Several in July and August. This appears to be a common and widely distributed species.

segnipes Say. Not rare upon willows, especially when in flower. Habitat given as Middle and Southern States.

The above three species were named for me by Mr. John B. Smith, who has recently (Trans. Am. Ent. Soc., vol. xi., pages 41–68) revised the extensive and difficult group of the Apioninæ, and described many of the species. I have other species which, for want of time, have not yet been determined.

Dorytomus longulus Lec. Three or four specimens. July.

Grypidius equiseti Fab. Not rare. Taken on different trees.

Procas picipes Steph. Several specimens. Captured in October nearly every year on fences, etc., about the city; may perhaps feed upon potato.

Anchodemus angustatus Lec. Abundant in July on Sagittaria along the canal, feeding on the leaves of the narrow-leaved form.

Otidocephalus chevrolatii Horn. On elm, hickory, etc.

Orchestes niger Horn. A small, black hopping beetle, abundant in spring upon willows, and frequently on other plants.

subhirtus Horn. This is a pretty species, with white bands across the elytra, of which I have taken three or four upon willows when in bloom. One captured later (15th July) is slightly larger and differs in elytral markings and in color of legs.

Elleschus bipunctatus Linn. Rare on shrubbery.

Pseudomus truncatus Lec. Abundant in June on dead limbs of old butternut trees. (See CANADIAN ENTOMOLOGIST, vol. xv., p. 79.)

Acoptus suturalis Lec. On hickories in June; larvæ evidently bore in bark, and adjacent wood, of old or dead trees.

Ceutorhynchus decipiens Lec. Rare on Sagittaria in July.

Stethobaris tubulatus Say. Rare. Found in the flowers of orchids in June by Mr. Fletcher; also (by myself) in July on *Habenaria psychodes*.

Rhyncholus oregonensis Horn. Rare under bark of hardwood trees.

As a large proportion of my weevils are still undetermined, it is probable that I will be able, on some future occasion, to make further additions to our present record.

(Concluded.)

CORRESPONDENCE.

Dear Sir: I have the pleasure of informing you of a somewhat important addition to the Canadian list. When on a visit recently to my friend, Mr. Kilman, of Ridgeway, in the Co. of Welland, whilst looking over his Lepidoptera, my attention was arrested by the unusual appearance of some specimens labeled *Callosamia promethea*. As I was pondering and puzzling over them, it began to dawn upon me that it was not *promethea* I was looking at, but *angulifera*, and upon enquiring, he informed me they were his own captures in that locality.

A few years ago I was put in possession of two pairs of *angulifera* through the kindness of Mr. James Angus, of New York, the first I had seen of them. You are aware how marked the difference is between the males of the two species, the male *angulifera* bearing a strong resemblance in both form and color to the female *promethea*, with the addition of the heavy whitish angular mark in the centre of the wings, from which

I presume it obtained its name. Mr. Kilman had three specimens, two males and a female. He gave me a male, and on comparing it with the N. Y. specimens, I find it two sizes larger, and with less yellow in the general coloring. The locality where Mr. Kilman resides is particularly favorable for entomological pursuits—sandy hills and gravelly ridges, with their appropriate vegetation—marshy flats full of flowering shrubs and weeds—virgin forests with an abundance of decayed and decaying timber—belts of young second growth trees—swampy and dry ground, and long cultivated fields with their diversity of vegetable productions, all in close proximity to Lake Erie shore, whilst any and all of them are within easy reach of a few minutes' walk, making an exceedingly attractive and productive hunting ground for the collector. Mr. Kilman is working it up with considerable industry, and has secured many rare and desirable things, and when he gets them correctly identified, will be able to present a most creditable list. J. Alston Moffat, Hamilton, Ont.

Dear Sir :—Some two or three years ago I reared from the egg several hundred caterpillars of the Promethea moth. They were feeding finely upon the common lilac *(Syringa vulgaris)*, the leaves of which they ate readily. The third moult had been reached and they had attained to an inch or more in length, and there seemed every prospect of their reaching maturity, when in an evil hour an oriole discovered their whereabouts. The bird was soon joined by a companion, and the pair proceeded to kill and eat with the greatest possible avidity. Discovered in their work by persons in the house, they were several times driven off, but quickly returned with increased zest to the work of destruction. On my arrival an hour later there remained but a few of the smallest specimens, which had either been overlooked or left to grow fatter.

W. W. Hill, Albany, N. Y.

Dear Sir : *Chrysomela scalaris*—I am not able to ascertain why in Crotch's list *C. multiguttis* Hal. is accepted—is never rare in Cambridge. But this year, during May, it has been so unusually common that in certain localities a pint could be collected in a very short time on elm trees. I was told that some trees here have suffered, but I was not able to see them. At least the beetle was so exceedingly numerous that it was everywhere exciting attention of non-entomologists by the armies mounting the trunks of elm trees.

Cambridge, Mass., June 15, 1884.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., JULY, 1884. No. 7

NOTES ON ANT LIONS.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

One day on my late visit to Ridgeway, a party of four went on an entomological excursion by boat to a place about four miles west, called Point Abino. After taking a survey of the situation and lightening our lunch basket, we went to work. Each had his specialty; one desired beetles, another butterflies. Seeing *Myrmelion* on the wing, I turned my attention to the Ant Lions. I did not succeed in securing many of them, for although the funnel-shaped pits of the nymphs were in surprising numbers, very few of the mature insects were to be seen, it being probably a little too early for them. I captured but four specimens, one *obsoletus*, and three of what was kindly determined for me by Dr. Hagen, of Cambridge, Mass., as *Myrmelion abdominalis* Say, whose figured-gauze wings are charming objects seen through a lens. The slight acquaintance I have with them has been acquired during my visits to Ridgeway, none of them having ever been seen about Hamilton so far as I know. Mr. J. Pettit secured an *obsoletus* while he was collecting at Grimsby, but I think he never got a second, although no doubt they were there to some extent, but probably very scarce. Fine loose sand is evidently a necessity of their existence in any locality, and I would suppose comparative seclusion; both of these they have in perfection at Point Abino. I saw large patches of sand so loose that weeds could not take root upon it, and which had not been disturbed by the foot of man or beast probably for weeks, and some of these places were so occupied with their pits that it did not seem possible to get another one in without interfering with those already there. These pits were about three inches across the top, and two or two and a half deep. Their width must be in exact proportion to their depth, for the slope of the sides is just what will support the particles of loose sand. They must have their pits to make frequently during their larval existence, for every heavy shower will fill them all up. They never expose themselves to view except by accident, but lie just immediately under the

surface. The larva is provided with an apparatus for throwing up the sand, which it can do with sufficient force to scatter it for four or five inches around, and with the rapidity at times of the tick of a watch, working itself downwards as it throws off that above it, the sand flowing in as it deepens, which it jerks up again, the most of which falls outside the range of the pit; and so continues the operation until the required dimensions are obtained, when it lies perfectly still at the bottom and awaits events. An industrious ant out on a foraging expedition, in the hurry of its eager search runs over the edge of the pit. The lion at the bottom seems to be instantly aware of the fact, and begins throwing up jets of sand with great rapidity, which come showering down, frightening the ant, and it makes frantic efforts to get out; but the mere vigorously it scrambles for the top, the more rapidly it slides to the bottom, where it is at once seized. The struggle ensuing dislodges the loose sand, and a miniature avalanche pours down from all sides, which materially assists the lion to secure its victim, and the ant is soon taken out of sight. I am not aware that it has any means of enticing its prey, and as it does not go searching for it, but is entirely dependent on what happens to come in its way, I suspect it must have many a long wait between meals.

The mature insect is neither a rapid nor a graceful flier, but flaps its wings in a heavy, clumsy manner, quite different from what one would expect in so exquisitely delicate a creature. It prefers to alight in an upright position, and rests with its wings folded close to its sides.

AN ICHNEUMON PARASITE OF MAMESTRA PICTA.

BY F. B. CAULFIELD, MONTREAL.

On July 19th, 1881, a caterpillar of this moth was found on a cauliflower which had been brought from market, and was placed in a tumbler with some of the leaves. By the 21st it had shrunk considerably in size, and was greatly changed in appearance, the black and yellow markings that make this larva so conspicuous an object having faded to a dull whitish color. On the 22nd it was lying on the bottom of the glass and was revolving continuously. Under natural conditions it would, I believe, have entered the earth to go through its transformations, and the curious revolving motion might perhaps have been for the purpose of forming and smoothing its cell. On looking at it on the morning of the 23rd, a soft

white flattened ichneumon larva had issued from it, and had commenced the construction of its cocoon by spinning a few white threads. By evening it had surrounded itself with a thin egg-shaped cocoon of a yellowish white color, through which the movements of the enclosed grub could be seen. On the morning of the 24th the cocoon was finished and was dense and firm. It was of a reddish-brown color in the middle, blackish-brown at each end. The perfect insect emerged on September 13th, 1881, and proved to be *Ophion purgatus* Say. *Mamestra picta* is a well known insect, and is treated of by Harris, Riley, Lintner and others, but I do not remember seeing any account of its being attacked by a parasite.

THE PARASITISM OF EUPELMUS ALLYNII, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

The fact that this species is a parasite in its larval state does not seem to be questioned, but that it is a parasite on one or more species of *Isosoma* is, I understand, doubted by some entomologists. For the past two years the writer has had no doubt that such was the case; but it is possible the evidence upon which such a conclusion is based may not be generally known. For this reason a brief summary of observations may not be out of place.

That it is a parasite on *Isosoma hordei* seems evident from the following: A single joint of rye containing several galls formed by *Isosoma hordei* was put into a bottle and corked up so that no insects could get out or in. In due course of time a specimen of *E. Allynii* was found in the bottle, and the hole from which it had gnawed its way out of one of the galls was plainly to be seen. Afterward the other galls gave forth *I. hordei.* In this case there could be no question but that the specimen of *E. Allynii* came from the gall made by *I. hordei.* If no *hordei* had hatched from the other galls, this would have been evident, for the galls made by this species are too characteristic to be mistaken by any one at all familiar with their work.

I have bred quite a number of this species from the inside of the stems of wheat; and in all cases they came from the cavities inside the stalk that had been gnawed by *Isosoma tritici.* Though this species of *Isosoma* makes no gall, its manner of eating the tissue around the inside cavity is rather characteristic, so much so as to be readily recognised after

a little observation. I have found a species of grass worked in by another species of an allied insect, but the manner of work is so different as to be unmistakable. *Isosoma elymi* makes a cavity on the inside of *Elymus Canadensis* that is more nearly like that made by *I. tritici* in the wheat, but they differ somewhat.

In the fields I have found specimens of *E. Allynii* emerged from the pupa skin, but still inside the cavity of the stem; others with the hole by which they expected to emerge gnawed so that they could almost get out, and they still there with the body partly protruding, and others when they had gone, the clean cut hole indicating where they had obtained their freedom. I have bred many specimens from the straws after they had been collected, and the conditions were the same as those in the field, the inside of the stems in all cases being examined before putting them into the breeding jar.

From these facts I do not see how I could avoid the conclusion that *Eupelmus Allynii* was a parasite on the two species of *Isosoma*. I may say that my breeding jar in the case of such small insects is a jelly dish, where there is no chance for anything outside to get in.

GALERUCA XANTHOMELAENA, Schrank.

BY FREDERICK CLARKSON, NEW YORK CITY.

I visited Flushing, L. I., July 8th, to examine the insect reported to be infesting the noble old English elms which adorn the principal streets of that village. Three weeks ago these trees were in luxuriant foliage; they have now the appearance as if they had been scorched by fire. I discovered them to be attacked with a countless host of the larvae of this beetle. The American elm and other indigenous trees have thus far escaped, but it is not improbable, as this beetle is double brooded, that the numerous larvae will from the force of circumstance attack them. The eggs are laid in clusters along the veins of the leaves, on their under sides. The larvae, as soon as hatched out, begin to devour the leaves, which they render lace-like, and when full fed they do not undergo transformation by fastening themselves to the surface of the leaves, as is the habit with other species, and as I have seen recorded of this, but transform within the crevices of the bark. At this time, July 8th, the trunks of the trees are covered with the larvae seeking places to transform, and there is

scarcely a crevice of the bark but what is filled with the yellow pupal forms which will in a few days disclose the imagines. The ground immediately surrounding the base of the trees is covered with the pupae, which have been dislodged from their positions in the bark by the eager efforts of larvae crowding in the crevices to undergo transformation. As this change occurs within the crevices of the bark of trunk and limb, it becomes impossible, unless at great labor, to apply means for exterminating the pest. The evil, however, is likely to cure itself, for the larvae are so numerous, and such insatiate feeders, that starvation will probably end the visitation. Much good, however, can be done by brushing down the trunks of the trees, sweeping the ground immediately beneath, and destroying the entire mass by fire.

FURTHER REMARKS UPON THE VARIATION OF THE ELYTRAL MARKINGS IN CICINDELA SEX-GUTTATA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

Having been away from home the greater part of the summer, I regret that I have not been able to collect some of these beautiful beetles this season, so as to further observe the interesting relation between the varieties in number, as I should like to have done. I hope, however, that some one has made observations upon them, and will favor us with an account, which would, no doubt, be very acceptable to those interested in the genus.

Since contributing the first notes upon this subject, I have noticed that Say has described two varieties of *C. sex-guttata* in his monograph of the genus Cicindela, commencing on page 415, vol. ii., of the American Entomology, edited by LeConte. The first is

"Var. *a*. Elytra each with an additional spot, which is fulvous or white, and generally inconspicuous, placed behind the middle triangularly with respect to the two anterior, marginal ones."

This additional spot is the one I have called the fourth, and var. *a* of Say therefore includes the second and third varieties given in my table (CAN. ENT. xv., 208), as the description says that this fourth spot is "generally inconspicuous," implying that in occasional specimens it is conspicuous; in the second variety of my table this spot being rudimentary, while in the third it is well developed. This phrase also implies

at the same time that the specimens with the additional spot inconspicuous were of much more frequent occurrence than the others, thus proving that Say also found the second the most numerous form, as I have shown to be the case out of forty-nine specimens taken last summer, in the table just referred to. That it was more numerous than his second variety, now to be given, we shall see to be evident, as the latter was probably described from one specimen, the form being very rare.

"Var. *b*. Each elytron with a single marginal spot, the two posterior ones wanting."

This description coincides exactly with that of the two-spotted specimen taken by Mr. Harrington (whose words upon this variety I have already quoted, CAN. ENT., xv., 207). I notice that Mr. Harrington very kindly records having since found that his specimen, believed to be only two-spotted, has also rudiments of the posterior spots (CAN. ENT. xv., 239), which, however, makes it none the less interesting a form. It is not impossible that Say may have overlooked the very rudimentary dots which his var. *b* perhaps possessed, since in many cases they are perfectly indistinguishable without a glass, unless the elytra be opened and held up to the light. Though his specimen may not have had the rudiments of the same spots as Mr. Harrington's possesses, still, from the markings at once discernible upon both, the two may without impropriety be said to be the same. Speaking further of this variety, Say tells us that it was brought by Mr. Thomas Nuttall from the banks of the Missouri, above the confluence of the Platte, the region which produced many of his species of Cicindela. Thus we find that the present form has occurred in two distinct and widely separated localities: near Ottawa, Ont. (Mr. W. H. Harrington, latter part of May, 1881, CAN. ENT. xiv., 8) in the great St. Lawrence Basin; and many years before that up the banks of the Missouri, which river constitutes the western portion of the great Mississippi System. We may notice also that in each case the locality of occurrence was situated upon the opposite side from that upon which the other great river system bordered, and at about the centre of farthest removal from it. This proves without a doubt that the variations are wide-spread.

But we have yet another early record upon the subject. In Harris' Entomological Correspondence there is a letter in which Hentz wrote to Harris the following from Northampton, Jan. 1, 1826:—

"*Cicindela sexguttata* I have frequently observed, and have many accidental varieties. The color varies from a deep blue to a bright green.

I have several with the additional spot which you mention; but if you examine your specimens with care you will, I think, discern that mark, or a faint trace, in most of them."

It seems that Harris had previously called the attention of Hentz to an additional spot (probably the fourth) in this species, the above being his reply. Thus was this same variation in the elytral markings observed nearly sixty years ago by Hentz and Harris; the former leaving us to infer from his last sentence that *he also* found the variety with the rudimental fourth spot of the most frequent occurrence. Hentz also observed, as others, myself included, have done, that the ground color of the specimens varies from the typical bright green to a deep blue.

One word more as to the same peculiarity of which our subject treats having been observed in foreign species. Wood gives us some interesting information in his Insects at Home, page 16, upon the variation of the elytral markings in *C. campestris* of England. He says:—

"The color of this beautiful beetle is gold-green above, and shining copper-green below; and there are several yellowish spots on the elytra, varying much in shape, number and hue. Sometimes there are only three, but in many specimens there are six. In former times the variety in the nnmber of spots was thought to indicate that the beetles belonged to different species, but it is now decisively ascertained that they are only varieties of one single species."

Many other species of *Cicindela* are known to vary considerably in their elytral markings and coloration, some much more than others. *Cicindela* is indeed a variable genus.

NOTES ON CHRYSOMELA.

BY GEO. H. HORN, M. D.

Chrysomela scalaris Lec. The question asked by Dr. Hagen in the June number concerning the name of this insect, is more easy to answer than to arrive at a definite conclusion. Stal, in his monograph, did not recognise many of the genera into which *Chrysomela* had been divided; among them were *Doryphora* and *Leptinotarsa*. Finding that Olivier in 1807 had described a *D. scalaris*, and that Maj. LeConte in 1824 a *Chrys. scalaris*, Stal superseded the latter name by *multiguttis*. Recent authors are in accord in adopting many of the genera rejected by Stal,

and the name originally given our species becomes valid and has been adopted by Jacoby (Biol. Cent. Am., vi, pt. i., p. 197, pl. xi., fig. 6). That the name should remain in future *Calligrapha scalaris* is fortunate, since we have lately received from Arizona a specimen of *Calligrapha multiguttata* Stal (in cab. Lec.), which is well figured in the work above cited, pl. x., fig. 5.

Calligrapha opifera Stal. To this species I refer some specimens collected by Morrison in Arizona. They differ from the figure given by Jacoby (Biol. loc. cit., pl. 12, fig. 10) in having the elytral markings narrower, so that the sigmoid band does not unite with the sutural stripe. In all other respects there seems to be no difference; the markings are of the same type and occupy the same relative position.

Calligrapha labyrinthica Lec. Under this name specimens have been distributed in many cabinets, based on a name long existing in Dr. LeConte's cabinet, and which has never been published. The markings so exactly reproduce those of *C. pnirsa* Stal (Biol. loc. cit., pl. 11, fig. 18) that I have no hesitation in referring our specimens to that species. My specimens are from Canada. I have no memorandum of the locality of those in LeConte's cabinet.

Calligrapha limbaticollis Stal, should be omitted from our lists. The species was added by Crotch on the authority of several specimens marked "Chicago" in the cabinet of Dr. LeConte. On inquiry by me concerning these specimens, Dr. LeConte told me that the source from which he obtained them had proven very unreliable in other cases, and he advocated removing the above name from our lists.

Doryphora (Leptinotarsa) melanothorax Stal. A specimen collected by Prof. Snow in New Mexico is in LeConte's cabinet, and has been identified by the latter with this species. It is of the form and size of *Haldemani*, etc., head and thorax black with a slight tinge of green, the elytra vittate nearly as in *decemlineata*.

Plagiodera flosculosa Stal. A specimen of this species is in my cabinet from California. Body oval, not very convex, beneath aeneo-piceous. Head piceous, front testaceous. Antennae with the five basal joints testaceous, the outer joints black. Thorax sparsely finely punctate, piceous, the apex and sides testaceous. Elytra coarsely sparsely punctate without order, yellowish, suture black, except a short distance at base, a median transverse black band, sinuous on its margins and wider exter-

nally, an oval humeral black spot, a smaller one within, a large triangular black spot, which is emarginate in front, near apex.

This species is well figured in Biol. Cent. Am., vol. vi., pt. 1, pl. x., fig. 1, with the name *aeneiventris* by mistake.

LIST OF GEOMETRIDÆ CAPTURED AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

Choerodes clemitaria, A. & S.
" transversata, Drury.
Tetracis crocallata, Guen.
" lorata, Grote.
Metanema quercivoraria, Guen. Very rare.
" inatomaria, Guen. Rare.
" carnaria, Pack.
Caberodes confusaria, Hübn.
" majoraria, Guen. Rare.
Ennomos alniaria, Linn.
Eudalimia subsignaria, Hübn.
Azelina hubnerata, Guen.
Endropia serrata, Drury.
" obtusaria, Hübn. Rare.
" effectaria, Walk.
" bilinearia, Pack.
" armataria, H.-S.
" vinulentaria, G. & R. Very rare.
" marginata, Minot.
" warneri, Harvey.
" hypochraria, H.-S.
" duaria, Guen.
Epirranthis obfirmaria, Hübn.
Therina fervidaria, Hübn.
Metrocampa margaritata, Linn.
Antepione depontanata, Gr. Rare.
" sulphurata, Pack. Very rare.
Sicya macularia, Harr.
Hesperumia ochreata, Pack. Rare.
Angerona crocataria, Fab.
Nematocampa filimentaria, Guen.
Plagodis rosaria, G. & R. Very rare.
" keutzingaria, Gr. Very rare.
" fervidaria, H.-S. Very rare.
Hyperetis amicaria, H.-S.
Aplodes packardaria, Gr.
Nemoria subcroceata, Walk.
" gratata, Walk.
Eucrostis chloroleucaria, Guen.
Ephyra pendulinaria, Guen.
Acidalia inductata, Guen.
" quadrilineata, Pack.
" enucleata, Guen.
Asthena lucata, Guen. Rare.
Stegania pustularia, Guen.
Gueneria basiata, Walk. Rare.
Deilinia variolaria, Guen.

Deilinia erythemaria, Guen.
Eudeilinia herminiata, Guen.
Corycia vestaliata, Guen.
" semiclarata, Walk.
Eumacaria brunnearia, Pack.
Semiothisa bisignata, Walk.
" enotata, Guen.
" granitata, Guen.
Phasiane orillata, Walk. Rare.
" mellistrigata, Gr.
" trifasciata, Pack.
Thamnonoma wavaria, Linn.
" sulphuraria, Pack. Rare.
" brunneata, Thun. Rare.
" argillacearia, Pack.
Lozogramma lactispargata, Walk.
" detersata, Guen.
" atropunctata, Pack. Rare.
" defluata, Walk.
Eufitchia ribearia, Fitch.
Orthofidonia exornata, Walk. Rare.
Caripeta divisata, Walk. Rare.
" angustiorata, Walk. 1 ex.
Ematurga faxonii, Minot.
Fidonia truncataria, Walk.
" notataria, Walk.
Caterva catenaria, Drury.
Cleora pulchraria, Minot.
Cymatophora larvaria, Guen. Rare.
" humaria, Guen. Rare.
" pampinaria, Guen.
" crepuscularia, Tr.
Tephrosia canadaria, Guen.
" cognataria, Hübn.
" anticaria, Walk.
Paraphia subatomaria. Guen. Rare.
Biston ursarius, Walk. 1 ex.
Eubyja cognataria, Guen.
" quernaria, A. & S. 1 ex.
Hybernia tiliaria, Harris.
Anisopteryx autumnata, Pack.
Operophtera boreata, Hübn.
Heterophelps triguttaria, H.-S.
Baptria albovittata, Guen.
Lobophora geminata, Gr. Very rare.
" vernata, Pack.
" montanata, Pack.
Triphosa indubitata, Gr.
Hydria undulata, Linn.
Phibalapteryx intestinata, Guen.
Anticlea vasaliata. Guen.
Rheumaptera ruficillata, Guen.
" fluctuata, Linn. Rare.
" lacustrata, Guen.
" unangulata, Haw. Rare.
" lugubrata, Schiff.
" hastata, Linn.
Ochyria ferrugata, Linn.
" designata, Hübn.
Petrophora diversilineata, Hübn.
" testata, Linn.
" prunata, Linn. Rare.
" albolineata, Pack.
" hersiliata, Guen.
" truncata, Hufn.
Hydriomena trifasciata, Borkh.
Epirrita perlineata, Pack. Rare.
Plemyria fluviata, Hübn.
" multiferata, Walk. Rare.
Glaucopteryx cumatilis, G. & R.
Eupithecia miserulata, Grote.
" two undescribed species,

ATTACUS CINCTUS, Tepper.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

A friend of mine—Mr. R. J. Mendenhall, of Minneapolis, Minn.—while travelling in Mexico last winter, collected from a tree, supposed to be the wild olive, a number of the cocoons of some large Bombycid. On his return home he kindly gave these cocoons into my keeping, with the information that he could easily have collected hundreds had he had con veniences for carrying them, as the trees on which they were found had been ruinously defoliated by the insect in its larval state. The cocoons were about the size and somewhat resembled those of *Telea polyphemus*, but were rather more elongate and were not intermixed with the chalky substance seen on the surface of the latter. They depended from the twigs by bands or cords of silk from five to seven inches long.

When I received them, about the last of March, several of the moths had already attempted to make their escape, but owing to close packing had died in the act, and all that I could determine was that the colors were similar to those of *cecropia*. The cocoons that were yet intact were placed in a large rearing cage and sprayed with water, and on the 4th of April I had the pleasure of beholding for the first time a perfect specimen of the striking and beautiful species named above. Every entomologist will understand my delight as I examined its rich coloring, the large, triangular mica-like plates with which the wings were ornamented, and the band of bright colors laterally encircling the abdomen.

In the course of the following two weeks fourteen or fifteen perfect specimens emerged, as well as some that were imperfect. They exhibited considerable variety in shade. In the majority the general color tone was a rich brown inclining to olive, others were suffused with red, while a few were of a cold gray tint.

There were more males than females, and quite singularly, the former were in nearly all cases larger than the latter. Desirous of seeing the larvæ, I used every device of which I could think to obtain fertile eggs, but without success. Many eggs were scattered about on the sides of the cage and on twigs of cherry, plum and apple to which the moths were confined, but none of them hatched. I also liberated all crippled or injured specimens on various trees where I could in a measure keep guard over them, but they refused to adapt themselves to their new environment and perished without progeny.

As soon as the first specimens were dry, I sent examples to Prof. Riley, who determined them as *Attacus cinctus* Tepper. first described and figured in the "Bulletin of the Brooklyn Entomological Society for January, 1883."

One fact in connection with these specimens struck me as singular, viz., that not one of my thirty or more pupæ were parasitized. With us so large a proportion of Bombycid pupæ, under natural conditions, are destroyed by *Ichneumonidæ* and by *Chalcis* and *Tachina* flies, that I confidently expected to get something new in this line also.

Mr. Tepper's types were collected in Southern Arizona, but he does not tell us the species of tree on which they were found. Neither was Mr. Mendenhall quite certain that he had been correctly informed concerning the Mexican tree from which he made *his* collection. Consequently the food plants and larval history of this magnificent species still remain to be investigated by some entomological explorer in southern latitudes.

CITHERONIA REGALIS, Hubner.

BY FREDERICK CLARKSON, NEW YORK CITY.

In a late number of this journal, Mr. Hamilton makes some criticisms upon an article contributed by me to the January number, having reference to the transformations of this moth. That article was prepared having regard, as a matter of course, to the climate of this locality, and as the specimens referred to were developed in the one season, the question of variation of temperature was not under consideration. That the transformation of the pupa can be furthered or delayed by atmospheric conditions, is well established; a warm room developing the imago at an earlier period than natural, and an ice-house holding it in check over one season, to be developed when restored to the climatic influence of another. My point was, from facts ascertained by rearing in confinement, with surroundings as near natural as possible, that the period of pupation, whether early or late, did not create an earlier or later development of the imago, which commonly occurred at the end of May. The history of the transformation of this moth under natural conditions, would be more satisfactory than that which results from rearing in confinement, and I regret that my town residence in winter denies me this study. That extraordinary

seasons further or hinder the advent of insects, is undoubtedly true, but as a general rule their time-table is quite as exact as the migratory birds.

I think it may be problematical as to whether the pupa remains beneath or upon the surface of the ground during the winter. My experiments, after having made the most natural provision at hand, have resulted in the pupa appearing upon or near the surface, and I would add that I find by my records that a larva obtained the previous season to that mentioned in the article already referred to, transformed in the same manner, the moth appearing on the 28th of May. My theory, in the absence of more essential data, is that the pupa of this moth, in its natural state, seeks the surface and finds security under the winter leaves. I have read with much pleasure what Mr. Hamilton writes with regard to this question, but it seems to me that the only satisfactory test, other than natural, would be in the use of soil common to the growth of the hickory, as that which is the most likely habitat of this species at this period of its history, giving to the pupa when thus conditioned the full serviee of all climatic changes. The provision as recommended by Mr. Hamilton is somewhat in agreement with what I have stated. He writes: "Take two parts of sandy loam, such as is used by plasterers, and one part of black friable soil from the woods, mix together * * and when the larva disappears cover over with a layer of moss, and then the pupa will not come to the surface." This effectually imprisons the pupa, and it becomes a matter of curious enquiry if the larva, in order to transform, could have selected a spot similarly conditioned.

ON TROGODERMA ORNATA, PHYSONOTA UNIPUNCTATA AND TANYSPHYRUS LEMNÆ.

BY JOHN HAMILTON, ALLEGHENY, PA.

Trogoderma ornata. Since the publication of the remarks in vol. 15, p. 91, more has been learned concerning this pest. That it disclosed without entering the earth was eventually made evident by several of the beetles being found in a large, close box, just emerging. Why they should disclose in a large box and not in a small one was not very obvious. At last the thought occurred that hygrometric differences in food and atmosphere might account for it. Having some of the larvæ reared in a small wooden pill box, at the usual time for pupation some of these were placed

in another box of the same size, and their food moistened. In a few days they were found to have pupated, the beetles emerging about ten days thereafter. Their companions left unmoistened in the other box never developed. This is sufficient demonstration. Their entering the ground to pupate is exceptional, and the inference that they do so normally is erroneous.

Anthrenus varius is quite innocent when compared with this pest, the larva usually staying where the parent deposits the egg. But it is quite otherwise with our *T. ornata.* The female oviposits wherever she finds a dead fly, moth, or other insect; and when the young, after hatching, have devoured this, they travel off in every direction, gliding into boxes through the minutest crevice, often effecting an entrance with their jaws. Last summer a couple of small exchange boxes containing a few beetles were wrapped in four thicknesses of paper and stowed away. Later, the paper was found to be riddled with minute holes and these larvæ were in possession. An effectual mode to keep them out of boxes is to fold some crystalized white napthaline in a paper and pin it in each box, renewing it yearly. This preventive is reliable. I have some boxes made of Red Cedar, in which there are open seams, but no museum pest ever enters them. The introduction of this insect into my premises has been traced to a lot of moths, crickets, etc., sent me from West Chester, in Eastern Pennsylvania, and last year it had so increased as to give great annoyance. Having observed its habits as above, I applied vigorous treatment early this season, which I am satisfied has resulted in its absolute annihilation. As a knowledge of the method may be of advantage to some unfortunate entomologist, the outlines are given. About the first of April I saturated some two inches of the borders of the carpets around my rooms with a solution of corrosive sublimate in alcohol—two drachms to the pint. Then, in the corners and out-of-the-way places, powder and pill boxes were placed containing dead flies, moths, and small insects. The beetles oviposited in these, avoiding altogether such as occurred on the carpet along the walls. About the first of June it was considered safe to remove the traps and consign the whole to the flames. In connection with this, all refuse material in boxes, etc., not insect proof, was destroyed, and places that alcohol would not injure received a brushing with the solution. Result—not a single larva has been observed this season.

Physonota unipunctata Say. Three years ago, in the month of July, I found a colony of these beetles on the river bank feeding on *Monarda*

fistulosa L., taking over fifty individuals. They almost wholly stripped the mint of its leaves. A few of the larvæ were feeding with them—a curious object indeed ; bright yellow, its body depressed, oblong oval, with serrate spinose margins and a long bifurcate caudex turned over its back, reaching nearly to its head. I regret a more minute description can not be given, as I neglected to take any of them at that time, and none could be found when again sought for. This species had not previously been observed here and has not been since. The whole colony was no doubt the progeny of one beetle transported from some more northren region by the Allegheny during the annual spring inundation. They were all taken on a patch of mint not two rods square, none occurring on neighboring patches. With age the elytra become too hardened to pin in the usual way. All taken were of Say's type—namely, pale above with *one* black spot on the thorax. Mr. Randall, in the Boston Jour. Nat. Hist., vol. 2, p. 30, describes a variety *(Cassida helianthi)* with *three* black spots on the thorax and with the elytra in life "blackish, irregularly spotted with white," which he found on a species of *Helianthus*. Messrs. Walsh & Riley describe another variety *(Cassida 5-punctata)* found in Northern Illinois, the food plant of which has also been discovered to be a *Helianthus*. Mr. Say mentions still another variety occurring in Mexico of a smaller size and with a transverse, arcuated, black line on the thorax behind the abbreviated one.

Thus it appears that the species as a whole is very variable as to color ornamentation. It would be interesting to learn whether the races breed true to their types, or whether like *Anomala undulata* Mels., color variations occur in the same brood. And further, whether each race has a food plant of its own. Perhaps some of your readers living where the species occurs frequently could give the desired information.

The colony that was found here must have fed on the *Monarda* of choice rather than of necessity, because three species of *Helianthus (decapetalus* L., *giganteus* L., *divaricatus* L.) grew with it and were not eaten by either larvæ or beetle.

Mr. Riley in his Second Annual Report on the Insects of Missouri, p. 59, gives a wood cut of a larva of *Ph. 5-punctata* W. & R., distended, classifying it with the me[r]digerous larvæ. The ones I saw must have been nearly mature and were all clean, their furcate tails turned forward over their backs and not loaded with stercoraceus matter and cast skins,

however it may have been with them when younger and in greater need of protection.

Tanysphyrus lemnæ Fab. This is a very small thing, being among the minutest of Rhyncophora, about .05 inch in length, though this does not detract from its interest. Its trivial name is derived from the plant on which it feeds, *Lemna (minor)*, Duckweed, the little plant that floats on stagnant waters in the summer, mantling them with green, and like the insect, common to Europe and America. Though exceedingly abundant, it does not seem to be generally known, appearing on few catalogues. It occurs in August and September, and its presence may be known by observing the little circular hole it has eaten through the centre of the Lemna frond. They stay beneath the leaf as it lies on the water, or liquid mud, and come to the upper surface when this is agitated. Such as emege from clear water are entirely black, but those from the mud appear mottled; the dorsum of the thorax and elytra from which the mud is wiped as they come forth between the contiguous edges of the fronds, is black, while the other parts are more or less gray from the dried mud. No other Rhyncophorus insect being found on this plant, this alone will suffice for its identification when found. It has very long legs, and unlike most Curculionides, the insect in death does not fold them under its body, but spreads them out on either side.

LIST OF DIPTERA TAKEN IN THE VICINITY OF MONTREAL, P. Q.

BY F. B. CAULFEILD.

Determined by Dr. S. W. Williston.

BIBIONIDÆ.

Bibio albipennis, Say. Common, end of May and beginning of June.

TIPULIDÆ.

*Bittacomorpha clavipes, Fabr. Several specimens taken in a damp meadow, June.

XYLOPHAGIDÆ.

Xylophagus rufipes, Loew. Not common, June 7, 1877.

CŒNOMYIDÆ.

Cœnomyia ferruginea, Meig., *pallida* Say. Not rare on parts of Montreal Mountain, June, 1883. I found them sitting on ferns in open

places. I did not observe them in the more heavily wooded portions.

STRATIOMYIDÆ.

Stratiomyia obesa, Loew. Not rare, on flowers.

TABANIDÆ.

Chrysops callidus, O. Sacken. Not uncommon in woods.

" fugax, O. Sacken. Common.

Therioplectes socius, O. Sacken. Rare, one ♂ taken on blossoms of an umbelliferous plant, July.

" septentrionalis? Loew.

" lasiophthalmus, Macq. May 19, 1877.

Tabanus catenatus, Walk. Rare, one specimen taken resting on a stone by the river side, Lachine, July 15, 1877.

LEPTIDÆ.

Leptis punctipennis, Say.

ASILIDÆ.

Dasyllis flavicollis, Say.

" thoracica, Fab. Not common, open woods, July.

Laphria bilineata, Walk. Rare.

" gilva, Wilstn. Rare.

BOMBILIDÆ.

Anthrax alternata, Say.

" fulviana, Say.

" sinuosa, Wied.

Bombylius fratellus, Wied. Common on the border of a birch wood, Hochelaga, May 6, 1877.

THEREVIDÆ.

Thereva candidata, Loew.

SCENOPINIDÆ.

Scenopinus fenestralis, Linn.

SYRPHIDÆ.

Chrysotoxum ventricosum, Loew. Rare.

Syrphus ribesii, Linn. Common.

Sphaerophoria cylindrica, Say.

Xanthogramma flavipes, Loew.

Rhingia nasica, Say. Not uncommon.

Volucella evecta, Walk. Not rare.

Sericomyia chrysotoxoides, Macq. Rare.

" militaris, Walk. Not common.

Eristalis Bastardi, Macq. Not uncommon.
" tenax, Linn. Common.
" transversus, Wied. Common.
" brousi, Wilstn. Common.
Helophilus similis, Macq.
Syritta pipiens, Linn. Common.
Somula decora, Macq. Rare.
Chrysochlamys dives, O. Sacken. Not common.
Spilomyia fusca, Loew. Not common, on umbelliferous flowers, July.
" quadrifasciata, Say. Common on blossoms of Solidago, Aug.
Temnostoma aequalis, Loew. Rare.
Sphecomyia vittata, Wied. Rare.

CONOPIDÆ.

Conops furcillatus, Wilstn. Rare.
Zodion fulvifrons, Say.

TACHINIDÆ.

Hystricia vivida, Harris. Common.

MUSCIDÆ.

*Musca domestica, Linn. Abundant.

CORDYLURIDÆ.

Scatophaga stercoraria, Linn. Common.

SCIOMYZIDÆ.

Tetanocera pictipes, Loew.
" plebeja, Loew.

ORTALIDÆ.

Pyrgota undata, Wied. Not rare.
Ceroxys similis, Loew.
Seoptera vibrans, Linn. Rare, one specimen taken.
Chaetopsis aenea, Wied. Rare.

TRYPETIDÆ.

Straussia longipennis, Wied. Not uncommon.
Tephritis albiceps, Loew.

PIOPHILIDÆ.

*Piophila casei, Linn. Common, bred from cheese.

DROSOPHILIDÆ.

*Drosophila ampelophila, Loew. Common.

With the exception of those marked with an *, all the species in the above list were submitted to Dr. Williston, who kindly named them. As

I only took such Diptera as chanced to come in my way while collecting Coleoptera and Lepidoptera, the list is a very incomplete one. But as it contains some species not on the Society's List, I thought it better to give it, imperfect as it is, rather than wait until further collections would enable me to extend it.

NORTH AMERICAN TORTRICIDÆ, BY LORD WALSINGHAM, M. A., F. L. S., &c.

BY C. H. FERNALD, STATE COLLEGE. ORONO, MAINE.

The above is the title of a very interesting paper which his Lordship had the kindness to send to me, and which was published in the Transactions of the Entomological Society of London for April, 1884.

This paper of 27 pages and one colored plate contains descriptions of 24 new species and one new genus *(Pseudoconchylis)*, with copious notes on others. These insects were collected by Mr. H. K. Morrison in Mexico, Arizona, Montana, Wisconsin, North Carolina and Florida, and the paper is also of value in giving the distribution of many well known species.

His Lordship calls attention to the fact that *Conchylis bimaculana* Robs. is distinct from Hübner's *Pharmacis sartana*, although placed as a synonym in my Catalogue of the Tortricidæ. I had already reached the same conclusion from material which I received from Florida, but had not published the fact.

The generic names *Bactra* and *Aphelia* are both used, inadvertently, without doubt, for I have already shown (Ent. Month. Mag. vol. 20, p. 126) that they are synonymous and only one can be used.

Lord W. speaks in his introductory remarks as follows: "The great dividing range of the Rocky Mountains exercises, as might have been expected, a very important influence upon the Micro-Lepidoptera of North America, forming a barrier over which these delicate insects are apparently unable to pass. The proportion of eastern species found on the western side of this barrier is remarkably small, although the same genera are for the most part represented more or less abundantly in both parts of the continent."

While these remarks are certainly true, it is a noticeable fact that quite a number of species have actually distributed themselves all over the country and occupy the territory on both sides of the great mountain

ranges, but they are all species, so far as I know, which are quite polyphagus, or such as have been distributed through the agency of man.

This paper, together with others which his Lordship has previously published, has done much to advance our knowledge of the North American Micro-Lepidoptera, and we sincerely hope that he may continue his very valuable work.

CORRESPONDENCE.

Dear Sir: Hickory, walnut and sweet gum have generally been given as the food plants of *Citheronia regalis*, but I have a caterpillar nearly ready to pupate which has been raised on sumach *(Rhus copallina)*. I offered it *Rhus glabra*, but it only nibbled the edges of a few leaves and finally abandoned feeding until the other species was restored. A friend, to whom I communicated these facts, also found a caterpillar of *regalis* on *R. copallina*.

WM. T. DAVIS, Tompkinsville, Staten Island, N. Y.

COCOONS ON LILAC.

Dear Sir: It would be interesting to know if the cocoons noticed on lilac by Mr. Couper were really those of *Hyperchiria io*. I always thought that the larva of *io* left its food plant when full grown and spun its cocoon beneath old leaves and rubbish on the surface of the ground. Might not *Callasamia promethea* have been the species observed by Mr. Couper?

F. B. CAULFIELD, Montreal.

Dear Sir: In glancing through the June number (just received) of the ever welcome ENTOMOLOGIST, I noticè that Mr. J. Alston Moffat speaks of a specimen of *Callosamia angulifera* taken at Ridgeway, Ont., as being two *sizes* larger than a specimen from New York. To me this expression is meaningless. I should be glad if Mr. Moffat would give us the measurement in inches.

H. H. LYMAN, Montreal.

No. 5 issued July 29, 1884.
No. 6 issued September 18, 1884.)

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., AUGUST, 1884. No. 8

ENTOMOLOGY FOR BEGINNERS.

PULVINARIA INNUMERABILIS, RATHVON.

BY THE EDITOR.

This insect, which has commonly been known as the Grape-vine Bark-louse, might with perhaps greater propriety be now designated the Maple-tree Bark-louse, for the reason that it has been more frequently found on maples, and inflicted more injury on these trees, than it has on grape vines. The great abundance of this insect during the past season has called general attention to it and elicited many enquiries in reference to its history and habits; indeed, in many sections of Western Ontario, as well as in the adjoining States of Michigan and New York, it has appeared in such swarms as to endanger the lives of the trees attacked. Branches have been sent to us so thickly covered with the insect in its various stages of growth that they could not be handled without crushing some of the numerous population.

The earliest description of this insect was given by Dr. S. S. Rathvon, of Lancaster, Pa., in 1854, who at that time gave the results of several years' observation on this species, which had occurred in his neighborhood on the Basswood or American Linden trees (*Tilia americana*). He found them to swarm in such countless hosts that he gave the insect the significant name of *innumerabilis*. The late Dr. Fitch next published an account of it in the Transactions of the N. Y. State Agricultural Society for 1859, since which several authors have figured and described this insect; but its life history was not fully unfolded until taken in hand by the late lamented J. D. Putnam, of Davenport, Iowa, who published in 1879, in the Report of the Davenport Academy of Sciences, a most elaborate and complete description of its life history, illustrated with two plates crowded with figures representing the various stages of development, all drawn by himself from nature. To these several publications we are mainly indebted for the facts here presented.

This bark-louse appears first in the form of a brown scale, from which, as it increases in size, there is protruded from the female scale cylindrical white filaments of a waxy nature, in which eggs are laid, and these cotton-like filaments, as new fibres are secreted, are constantly pushed further back until there protrudes a bunch about four times as large as the scale, as shown in fig. 5, which is thickly crowded with eggs. Permeating through the nest is a quantity of powdery matter which under a high magnifying power is seen to be in the form of rings. The waxen filaments are adhesive and elastic, and can be pulled out sometimes a foot or more before entirely separating. When heat is applied these fibres melt, and their waxy nature is further demonstrated by their solubility in ether and chloroform. A single nest will seldom contain less than 500 eggs, and sometimes upwards of 2,000. The female begins to lay eggs in the latter part of May, and continues laying from five to seven weeks, until she dies from exhaustion, her entire life continuing for about thirteen months. During the laying and hatching of the eggs she secretes a quantity of a sweet liquid known as honey-dew, which attracts ants, flies and other insects, and it often happens that the young lice crawl up the legs and bodies of these visitors, by whom they are thus carried to other trees.

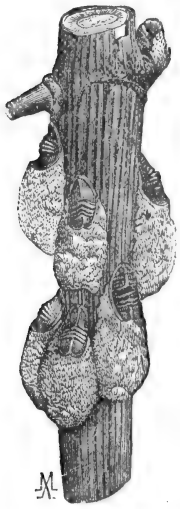


Fig. 5.

The newly hatched, yellowish-white lice soon distribute themselves over the branches, and attaching to the succulent portions, pierce the tender bark with their sharp beaks and subsist upon the sap. They shortly become stationary, when they gradually increase in size and finally reach maturity.

The scale of the male insect is very different from the female. It is longer in proportion to its size, and there are no waxy filaments projecting from it. When fully mature the insect escapes from its scaly covering and appears as a minute, beautiful and delicately formed two-winged fly, marked with yellowish and chestnut brown, with brilliant rose-colored wings which also reflect the colors of the rainbow. These flies do not appear until August and September, and their lives in the winged state are very short, not exceeding two or three days.

Besides the Maple and the Grape, these insects are, as already stated, also found on the Linden or Basswood, and sometimes on the Elm.

Where permitted to continue their depredations undisturbed, they weaken and injure, and occasionally destroy the trees attacked. They affect chiefly the under side of the branches and twigs.

REMEDIES.

The branches of the infested trees may be vigorously rubbed with a stiff brush or broom, which will dislodge many of the insects, and then coated with a strong alkaline wash made by melting either soft or hard soap and diluting it to the consistence of paint with a strong solution of washing soda; or they may be destroyed with an emulsion of coal oil made by agitating vigorously and for a considerable time one pint of coal oil with an equal quantity of milk, until the mixture assumes a creamy appearance, when it should be diluted with about ten times its bulk of water and applied with a brush or syringe.

DESCRIPTION OF THE LARVA OF HEMARIS TENUIS, Gr.

BY PH. FISCHER, BUFFALO, N. Y.

Head light green, around which is a ring of bright fine yellow granulations. Body light green whitish at the dorsal region; a whitish subdorsal line on each side running from caudal horn to third segment, also a dorsal green line running from caudal horn to 3rd segment, where they both become indistinct. Under side and legs chocolate brown, prolegs black, with a narrow white band near base. Caudal horn thin, slightly curved forward, flanked at base with bright yellow. Stigmata on first, and from third to tenth segments, dark blue. Length about two inches. Larva finely granulated with white. It is found from middle of June to end of July. Of these, some of the earliest larvæ will, after pupating, hatch within about two weeks, (the balance staying over till next spring) which will deposit their eggs and also grow to maturity towards the latter part of September; so that the larvæ may be found almost continually from June to October. The eggs are small, round and green, and hatch in about ten days; they are found on the under side of the leaves of *Symphoricarpus*, *Lonicera* (different species), and *Triosteum perfoliatum*, its food plants. The color of the larvæ of this latter brood varies considerably, some being a reddish brown with a slight purple tint, the head sometimes being yellow like the ring around it, sometimes brown; others when young are green above and black below, with a black head; others again have the normal color and other characteristics.

PHYTONOMUS PUNCTATUS, Fabricius.

The Punctured Clover-leaf Weevil.

BY A. H. KILMAN, RIDGEWAY, ONT.

A curculio new to Canada has appeared in this locality. Prevailing east winds about Aug. 10th wafted this new clover pest to our shores. This beetle, as far as I know, has not been mentioned in the Entomologist. It was introduced from Europe little more than three years ago. Appearing on the eastern seaboard, and taking the continent in the inverse order to the movement of the Colorado Potato Beetle, it is working rapidly westward. Last year no specimens were reported west of Rochester, while in Eastern New York the clover crop was destroyed by this insect. On the date above mentioned it appeared in Buffalo in such numbers that thousands were crushed on the pavements by the feet of passers-by. Simultaneous with this was its appearance in Ridgeway. I picked them from the fences and sidewalks, and found them in the grass on my lawn. Mr. Reinecke could have gathered them by the quart along the lake shore at Buffalo, where they had stranded after being carried by the wind far out upon the water. They have the extraordinary faculty of closing their tracheæ and suspending respiration while in the water, and an hour's sunshine on the sandy beach leaves them none the worse for a good soaking.

The beetle is two-fifths of an inch long, has a stout body of a dark brown color; sides of thorax and elytra dull yellow, a central yellow line on thorax, rows of black raised points along inner half of elytra with dashes of the same muddy yellow towards the rear. Each female has a "depositing power" of from 200 to 300 eggs. She punctures the clover stem and places an egg therein. or sometimes attaches it to the surface of the stem. The larva feeds upon the leaves, which it destroys rapidly, eating only during the night and hiding in the day time.

I am of the opinion that the advance guard of this insect invasion arrived last year, and it is the main body now; and further that those now arriving will go into winter quarters and open up a lively campaign in the spring. I am led to these conclusions by the fact that many clover fields in this and adjoining counties failed this season to blossom fully, the Clover Midge getting the blame. Whatever the sequel may show, we fear

that these invaders will prove of better staying qualities than those who crossed the border in '66, and turned to the right about at Ridgeway, because Canada was not the "clover patch" they were looking for.

LIST OF SYRPHIDÆ TAKEN IN FAIRMOUNT PARK, PHILADELPHIA, PA., DURING THE SUMMER OF 1884.

BY E. L. KEEN, PHILADELPHIA, PA.

The species in the following list were taken in Fairmount Park during the past summer, and mainly during May and June, which is the best time for Syrphidæ; then there are some which only appear in the fall months. Of all families of Diptera the Syrphidæ seem to be better represented in the Park than any other families of this order, perhaps with the exception of the Dolichopodidæ. The Syrphidæ seem to prefer damp and somewhat open woods, especially a small wood that has a small rivulet running through, near the border, and where there are patches of May apple, with the sun shining through the trees on the plants. This only applies to some species, for others prefer the borders of woods, fields, etc. I never found many Syrphidæ in a hot and sandy county, for instance like New Jersey, but what it lacks in Syrphidæ it makes up with the Bombylidæ, for last summer I took about ten species of the latter family in one day, while I only took about seven species the whole summer in Fairmount Park.

The present list does not represent all the species found in the Park; it only includes the collecting of the earlier part of the summer, for during the fall months I did little or no collecting.

Paragus bicolor, Fab. Quite common during July and August.
" tibialis, Fallen. " " " "
Pipiza femoralis, Loew. Very rare; took one specimen May 3rd near a small creek.
" albipilosa, Willist., n. sp. Rare; two specimens May 15th in damp woods.
Chrysogaster nigripes, Loew (= Orthoneura ustulata, Loew). Not very common.
" nitida, Wied. All summer.

Melanostoma obscura, Say. Quite common in damp situations.
" mellinum, Linne. Very common in spring.
Platychirus hyperboreus, Staeg. Common.
" quadratus, Say. All summer in damp situations.
" peltatus, Meig. Common in spring.
" cœrulescens, Willist. Rare in spring.
Syrphus abbreviatus, Zett. May and June.
" americanus, Wied. May and June; very common.
" Lesueurii, Macq. All summer; common.
" Ribesii, Linne. Common.
" arcuatus, var. lapponicus, Zett. Rare; took a specimen on April 27th and May 3rd.
" sp. nov.
Mesograpta geminata, Say. All summer; very common.
" marginata, Say " not quite so plentiful as the above.
" polita, Say. Quite rare in comparison with the above two species.
Sphaerophoria cylindrica, Say. All summer; very plentiful during May and June.
Allograpta obliqua, Say. Quite common.
Xanthogramma emarginata (Say) Willist. Not very common.
" flavipes (Loew) Willist. Not very rare; took four specimens this year.
Ascia globosa, Walk. One specimen Aug. 25; quite rare.
Sphegina lobata, Loew. In spring, May 15 and 21, took several specimens in a damp woods; not very common.
" Keenii, Willist., s. nov. In company with S. lobata; took this species May 21; very rare.
Ocyptamus fuscipennis, Say. All summer, very common.
Baccha aurinota, Walk. Quite rare; took only one specimen in July.
" Keenii, Willist., sp. nov. Very rare; took this species in a path going through an open woods.
Rhingia nasica, Say. Very common in both sexes in woods.
Eristalis aeneus, Scop. All summer; commonest of all the species of Eristalis.
" Bastardi, Macq. Quite common during June.
" dimidiatus, Wied. Not rare; June and July.
" tenax, Linne. Very common all summer.

Eristalis transversus, Wied. All summer.
" Brousii, Willist. June; very common last year; only took two specimens this summer.
Helophilus similis, Macq. Quite common.
" latifrons, Loew. "
Pterallastes thoracicus, Loew. Not very plentiful; only two or three specimens are generally taken during a season.
Mallota posticata (Fabr.) Willist. Quite common.
" Bautias, Walk. Quite common.
Tropidia quadrata, Say. In damp and shady situations; common.
Criorrhina analis, Macq. Common in woods during May and June.
" intersistens (Walk.) Willist. Very rare; took three specimens May 23rd in a woods.
Brachypalpus frontosus, Loew. Very rare; I reared this species from a larva which I found between some loose bark on a stump of a tree.
Sericomyia limbipennis, Macq. Common in woods during spring and fall.
Xylota ejuncida, Say. Common.
" angustiventris, Loew. Not very common.
" pigra, Fab. Not very common in this locality.
Syritta pipiens, Linne. All summer; this is about the commonest of all Syrphidæ.
Somula decora, Macq. In spring and fall in woods; quite common.
Spilomyia longicornis, Loew. In September; not very plentiful.
Temnostoma alternans, Loew. In spring in woods; rare.
" bombylans. Quite common during May.
" pictulum, Willist., sp. nov. June; very rare.
Milesia ornata, Fabr. August; rare.

SYNONYMICAL NOTES.

BY GEO. H. HORN, M. D., PHILADELPHIA, PA.

LAMESIS Westw. Tijdschr. voor Entom. xxvi., p. 67. I would call attention to the possible identity of this genus and *Xenorhipis* Lec. The figure given by Westwood (pl. 3, fig. 8) certainly bears a very close

resemblance to that published by me of *Xenorhipis* (Trans. Am. Ent. Soc. 1882, pl. iv., fig. 7, 8). If the two should prove identical, the name given by LeConte (Proc. Acad. 1866, p. 384) should have priority.

L. suturalis Westw. occurs at Cordova, Argentine Republic.

Cyrtophorus gibbulus Lec. (niger ‡ *Lec.*) On examining this insect with Dr. LeConte, we were convinced that it does not differ in any respect from *Microclytus gazellula* Hald.

Leptura coccinea Lec. After refreshing my memory by a glance at the type in Mr. Ulke's cabinet, I visited the Agricultural Department and from force of habit glanced over the plates of Ratzeburg's Forst-Insecten, and I at once recognised a great similarity between my mental image of *coccinea* and *rubrotestacea*. On comparisons being made by Messrs. Ulke and Schwarz, the two were found identical. As the specimen was reported to Mr. Ulke probably in error as from California, the name should be placed as a synonym of *testacea* Linn. (= *rubrotestacea* Ill.) and dropped from our lists.

L. atrata Lec. After a careful examination of the very old unique in the cabinet of Dr. LeConte, the latter agreed with me that it was a specimen of *proxima* in which the customary black tip had extended, covering the whole elytra.

THE ASH SAW-FLY (*Selandria barda* Say).*

BY HERBERT OSBORNE, AMES, IOWA.

Allantus barda, Say. Bost. Jour. 1 (1835) 218. 7.
Selandria barda, Norton. Bost. Proc., viii., 220, 3.
" " " Proc. Ent. Soc. Phila., iii., 9, 14.
" " Cresson " " " " iv., 244, 1.
" " Norton, Trans. Am. Ent. Soc., i., 247, 4.

During the summer of 1882 a few of the ash trees on the college lawn became infested with a Saw-fly worm which for a few days threatened to be quite serious. I made a few trials of London purple on the trees most seriously infested, but before I had gained results from many trees or had completed a study of the larvæ, they suddenly disappeared. So

* Reprinted from Bulletin of the Iowa Agricultural College, from the Department of Entomology, 1884, No. 2.

far as my experiments went they showed the London Purple to be a successful remedy and as applicable to these worms as to any of the Saw-Fly group. No adults were observed, and none of the larvæ I had under my observation matured; so the matter necessarily came to a rest.

During the summer of 1883 the worms appeared in much greater numbers and distributed over many more trees. At the same time and upon the same trees with these worms I observed adult Saw-Flies that I could have little doubt were the mature worms, although I did not succeed in finding the eggs and obtaining the larvæ from them, nor have I reared them as yet from the immature stage. Their presence in large numbers at the time when newly hatched larvæ were appearing plentifully day after day, and the fact that the adult *must* be an insect of this particular kind, left little doubt as to their connection. During the present season I have observed these adults as early as April 15th, and the larvæ but little later, while the eggs from which the larvæ hatch were found deposited in the petiole of the leaf.

The adults are the *Selandria barda* of Say,* the food plant of which, so far as I can find, has never been recorded.

No account of the larva or of its work is given in any of the works that I have been able to consult, and as it seems to me of too much importance to remain unnoticed, I venture to give what I know of its history with the practical results of my study, notwithstanding the doubt that rests over some parts of its life history. The pressure of other duties at the time these worms were at work prevented me from giving them the time they certainly deserved.

LIFE HISTORY.

The eggs are deposited in rows along the sides of the petiole just beneath the outer bark, and so neatly that it is almost impossible to detect any break in the epidermis. Usually there are from six to ten on a leaf. They evidently increase much in size before hatching, pushing the bark up in a blister-like elevation, and if cut out of their covering are found to be very soft, the outer membrane exceedingly delicate and easily ruptured.

* In order to be certain that my determination of the species was correct, I sent specimens to Mr. E. T. Cresson, of Philadelphia, and he has kindly compared them with the specimens in the collection of the Am. Ent. Soc., and pronounces them identical, except a slight difference in size.

The larvae are evidently hatched within two or three days after the eggs are deposited, and are at first slender, whitish worms with black heads and thoracic legs. They crawl at once to the leaflets and appear to select the more tender ones for the commencement of their work. They grow quite rapidly and reach the first moult on the third or fourth day. Before moulting they are more whitish in color, and the head particularly loses its ordinary color. After the moult the head is jet black and glistens like a glass bead; the six thoracic legs have also the same jet black color; otherwise the larva is clear green with a slightly darker dorsal line. There

Fig. 6.—*Selandria barda* (Say). Leaf of ash showing position of eggs in petiole and work of larvæ.

are seven pairs of pro-legs or false legs along the abdomen and one pair at the tail end. The body is not hairy, neither is it slimy as in some members of this genus, but the skin is somewhat wrinkled.

The worms are mostly found adhering to the under surface of the leaves, and forming a coil, though sometimes extended, especially when feeding, and as they eat away the entire leaf, cutting away at the edges or at the holes entirely through the leaf, they obtain any poisonous substance sprinkled or dusted on the upper surface.

When young they usually keep pretty well clustered together or on the same leaf, but later scatter quite generally, the early clustering being due no doubt to the eggs being laid near together and on the same leaf. The worms moult at least three or four times before reaching maturity.

The worms leave the trees before entering the chrysalis stage, and while I have not succeeded in tracing this stage, it is reasonably certain that it is passed under ground, or at least below the surface mould. It is quite certain also that the winter is passed in the chrysalis stage.

The imago has been observed abundant from April 15th till into the month of May, and also in the month of June. Whether these are two distinct broods or simply the result of great irregularity in appearance, I cannot say. It is certainly possible, however, considering the time that the first larvæ require to attain their growth that they may pupate and issue as a second brood in the month of June. These adults are black throughout, except the upper part of the thorax, which is honey yellow or sometimes orange or reddish, the amount as well as the shade differing somewhat in different individuals. The males are more slender and shorter than the females. In some specimens the front legs are partially yellowish.

They appear to be most active during the heat of the day, and can be caught without much difficulty in the hand during cool evenings.

PARASITES.

Tachina Flies. On trees where these worms were plenty I observed numerous specimens of the friendly Tachinas, and I also found their eggs on great numbers of the worms. So numerous were they indeed that I felt that the worms could safely be left to their attention.

Ichneumon Fly. A small *Ichneumon* occurred also in pretty good numbers, and though I obtained no direct evidence of their preying upon the worms, the habits of the Ichneumons are so well known that there can be little doubt of the meaning of their presence.

The Spined Soldier Bug (Arma spinosa) was observed with the Ash worms impaled on its beak, so it can be counted upon to assist in destroying them.

REMEDIES.

London Purple. The trials I made with this substance proved that it is deadly to these insects, and where it can be used without too great

expense, it may be considered a certain remedy. On all small shade trees it can be applied as readily as to orchard trees, and even on trees of considerable height a good force pump will suffice to thoroughly sprinkle the leaves.

Hellebore is also very effective for these and other Saw-fly larvæ, but as it is no better than the preceding and much more expensive, there is no need of considering it here.

Arsenic may be used in solution like London Purple, but must be boiled to dissolve it.

REMARKS ON THE FAMILY BOMBYCIDÆ.

BY G. J. BOWLES, MONTREAL.

In the American classification of the Lepidoptera, the Bombycidæ occupy a place between the Zygænidæ and the Noctuidæ. They include a large number of genera and species, and are well represented on this continent. The principal characteristic of the family is that from which it derives its name of Bombycidæ,—or spinners,—the power the caterpillars have of producing a silken fibre, which they use in spinning a cocoon in which to pass the pupa stage of their existence. The Silk-worm moth, *Bombyx mori*, is the typical species of the family. Some genera, however, do not produce silk in any quantity. They are also remarkable as a family for the imperfectly developed mouth parts in the perfect insect. In nearly all of them the tongue is short, and in some species wanting, and the other parts of the mouth so imperfect that it is not probable the insects feed at all in the perfect state.

As the family now stands in our classification, it not only comprises genera and species of very dissimilar habits, but also includes insects of many sizes, ranging from small to very large. The largest moths in America belong to the Bombycidæ. It also includes various forms, some very low in the scale. The great majority of the larvæ live on the leaves of plants, principally of trees, but some are root feeders, and others bore even into the solid wood. There are probably no other larvæ that enjoy such a range of food plants as some of the Bombycidæ. To some species almost anything in the shape of a green leaf is acceptable and nourishing food, and they are consequently among the commonest of our moths. Others again are restricted to a single plant.

Some of our finest moths, both as regards size and beauty of form and decoration, belong to this family, while it includes many small and plainly colored insects, some of which have females which never possess wings, and never move away from the cocoons in which they have passed through the pupa state.

These facts seem to show that the Bombycidæ, as classified in America, are rather a heterogeneous collection of insects, whose claims to be included in one family are open to question. Packard, whose synopsis is the best so far published, divides it into the following sub-families; some of these, however, in Europe are given the family rank.

LITHOSIINÆ. All small moths, with the wings finely scaled, and generally day-fliers. *Lithosia*, the typical genus, is but poorly represented in Eastern America, there being only one or two species found here, while fourteen are found in England alone. The larvæ of this genus usually feed on lichens. To this sub-family belong the *Crocotas*, also *Euphanessa mendica* and *Deiopeia bella*. The caterpillars are generally a little hairy, and most of the species spin thin silken cocoons.

ARCTIIDÆ. A large and well known group. The moths are of medium size, and some of them beautifully colored, hence their common name of Tiger Moths. Caterpillars generally very hairy, and make soft cocoons, in which they interweave their hairs with silk. Their supply of the latter is not large. The principal genera are *Arctia*, *Spilosoma*, *Callimorpha*, *Hyphantria*, &c. Some of the larvæ are injurious to fruit trees.

DASYCHIRÆ. The Liparidæ of European authors. Packard restricts this sub-family to *Orgyia*, and a few other genera. The caterpillars of *Orgyia* are highly ornamented, and spin thin silken cocoons. The female moths are wingless.

COCHLIDIÆ. Cochliopodidæ of Europe. Small moths with curious slug-like larvæ, which spin cocoons almost globular in form, and of a gluey appearance, the silk being more of a gum than a fibre. This sub-family has some fourteen genera and twenty-eight species in Packard's Synopsis, but only a few of them are found in Canada.

PSYCHIDÆ. A small group of diminutive moths, not found in the Eastern States or Canada. They are closely related to the preceding sub-family.

PTILODONTES. A numerous sub-family, answering as a whole to the *Cuspidates* of Newman's British Moths, although the larvæ of some of our

species do not resemble those of the latter family. The caterpillars of the *Cuspidates* are singular in form, many of them being without anal prolegs, and others being bifid at that extremity. Very few American species have this formation, but some of them are humped, and are otherwise of uncommon shape, while others have the cuspidate habit of raising the anal extremity in the air while feeding or moving about. The sub-family includes the well known genera, *Icthyura*, *Datana*, *Notodonta*, *Cerura* and others.

PLATYPTERICIDÆ. This division is included in the European family *Cuspidates*. The moths are small, and all have falcate or hooked wings. In England the caterpillars of these moths are not hairy, but are marked with colored lines and spots, and some are without anal prolegs.

ATTACI. Comprises our largest and most beautiful moths, as well as those which produce the best and most plentiful supply of silk. Both moths and larvæ are well known.

CERATOCAMPIDÆ. The genera *Dryocampa*, *Hyperchiria*, *Anisota* and others belong to this sub-family of large and handsome moths. Some of the larvæ make no cocoons, but bury themselves in the earth like the Sphingidæ, and there become pupæ.

LACHNEIDES. Includes *Gastropacha*, *Clisiocampa* and *Tolype*, moths of medium or small size, with hairy bodies. The larvæ are smooth, with few hairs, and spin slight cocoons of silken fibre.

HEPIALIDÆ. A group of wood or root-boring moths, some of which are large and robust, others small and delicate in appearance.

A glance at the foregoing sketch will show the variety of insects we include in this family, and also the widely differing habits of the larvæ. And it is both curious and interesting to note the analogies which many of the species bear to the other divisions of the Lepidoptera, and even to the other orders of insects. In some cases the resemblance is so close that it is doubtful whether the species is rightly placed, and we might be justified in removing it to some other family of moths, perhaps a long way from the Bombycidæ. Thus in the first sub-family, the Lithosiinæ, the genus *Crambidia* very much resembles the genus *Crambus* among the Tineidæ. *Euphanessa mendica* is very like a Geometer, not only in the perfect state, but also as a larva, as stated by Mr. Saunders, who calls it a "true looper." In a classification based on larval characteristics, this moth would therefore be ranked with the Geometridæ. *Crocota ferru-*

ginosa is a well known species of this sub-family, and might also be taken for a Geometer. I have captured it flying in the sunshine, in company with *Nemoria*, a small Geometer which much resembles it in form, but is different in size and color. *Ferruginosa* does not make a cocoon, the chrysalis being found under stones, with the larval skin generally adhering to its extremity. In the sub-family Cochlidæ, one of the genera is named *Tortricidia*, from the great resemblance of the moths to those of *Tortrix*, they having narrow wings, slender bodies and filiform antennæ. The Psychidæ also contains some remarkable species. The genus *Phryganidia* has many analogies with the Phryganidæ, a group of water-flies in the Neuroptera, not only in appearance, but even in the neuration of the wings, according to Packard. A European species of this sub-family, *Psyche helix*, has been known to produce young from eggs not fertilized by the male. The larva lives in a case made of grains of sand arranged in the form of a snail shell, thus resembling the Phryganidæ in habits, as it also does in structure.

The sub-family Ptilodontes includes moths which are very easily mistaken for Noctuas. Indeed in some instances it is almost impossible to tell the difference, and, *vice versa*, there are moths classed among the Noctuidæ which, in the opinion of first-rate judges, should be ranked with this family. The first division of the Noctuas is styled the Bombyciæ or Bombycoides, from the resemblance of the insects to the Bombycidæ, not only in the perfect, but in the larva state. *Acronycta* is very like *Heterocampa* and the kindred genera in the Bombycidæ. The colors are similar and the larvæ are hairy, like those of *Arctia*. I notice in the *American Entomologist* for 1880, page 49, that these facts have engaged the attention of Mr. Butler, a high English authority, who communicated a paper to the London Entomological Society on the subject, illustrated by an exhibition of preserved larvæ from the collection of Lord Walsingham. He analyzed the genus *Acronycta*, as represented in England, with the following result: *Rumicis* and *auricoma* should be transferred to the Arctiidæ: *leporina* and *aceris* to the Liparidæ; *megacephala*, *psi*, *tridens*, *strigosa*, etc., to the Notodontidæ, leaving only *alni* and *ligustri* among the Noctuas. If the life history of our *Acronyctas* were worked up, and their larvæ all known, it would be an interesting task to trace the similarities of the species to the Bombycidæ, and might result in equally remarkable conclusions. One suggestive case might be mentioned. The larva of *Apatela* (or *Acronycta*) *Americana* is a large, woolly, yellowish caterpillar

with long slender pencils of black hairs. There is a Bombycid moth found in the Eastern States, *Apatelodes torrefacta*, whose larva, judging from Smith & Abbot's drawing, bears a striking resemblance to that of *Apatela americana*. It is also a large moth, and the two may be more closely connected than is at present admitted. One of them is placed in the Noctuidæ, the other in the Bombycidæ, with a number of genera between. The larvæ of the Noctuan genera before *Acronycta*, in their bizarre appearance, also resemble those of the Ptilodontes more than those of the Noctuidæ. Newman states that *Ichthyura (Clostera)* is closely allied to *Cymatophora*, a Noctuid genus, and should be placed near it in a natural classification.

In the small and beautiful sub-family Platyptericidæ, the moths are very like Geometers, their bodies being slender and the wings broad and finely scaled. They also rest with their wings expanded, as many Geometers do.

The last sub-family in the Bombycidæ is so different from the rest in structure, appearance and habits, that it should be separated from them and given the family rank, as in England. These insects, the Hepialidæ, are borers, the larvæ living either in the roots or the stems of plants, and although they make cocoons, these are hidden in the earth or the stem of the plant in which they have fed. In their structure the perfect insects resemble Neuroptera. The body is long and soft, the antennæ small, and the places of attachment of the fore and hind wings to the body widely separated, as in Dragon Flies and other aquatic insects. Both larva and pupa are also different in form from those of the remainder of the Bombycidæ.

The foregoing notes go far to prove that our Family Bombycidæ is at present too comprehensive. A future revision should raise a few of its subdivisions to family rank, which would make the classification more simple and more natural.

BOOK NOTICES.

Ottawa Field Naturalists' Club—Transactions No. 5 (Volume II., No. 1).

The Transactions of this active Club have just been received, and bear testimony to the value of the scientific work which is being done by our Ottawa friends. The number consists of 152 pages, is well printed

and has been carefully edited. We are glad to learn from the report of the Council that the annual membership has steadily continued to increase from the inception of the Society in 1878, and now is 128. Several valuable papers in different branches of natural history which were read during the winter of 1883-4, have been printed, among which we find a capital and very appropriate Inaugural Address from the President, Dr. H. Beaumont Small, in which the history of the Club is briefly sketched and present events of immediate interest to the Club referred to, after which the different systems of classification in the animal kingdom are treated of. There are tables given of the different systems of Linnæus, Dawson, Cuvier and Haeckel. The President states that the system taught by Principal Dawson (of McGill College) is included as he is our leading Canadian authority, and his system is a fair example of many in vogue at the present day. This is followed by "Notes on the Flora Ottawaensis," which specially refers to introduced plants. Prof. Macoun contributes a paper upon "Edible and Poisonous Fungi." This is followed by perhaps the most valuable paper of all, "A List of Ottawa Coleoptera," by our esteemed correspondent, Mr. W. Hague Harrington. This list shows not only great care on the part of the author in preparing it, but remarkable diligence and assiduity in making the collection of which it is a record, all of which are available for reference. The list contains no less than 1,003 species, 110 of which are new to Canada; all of these were collected within a radius of 12 miles from the City of Ottawa, chiefly by Mr. Harrington himself. This list is remarkably free from errors, and unusual care has evidently been taken to have the nomenclature correct and all synonyms eliminated. Altogether this list forms an important addition to our entomological literature. Following this is a paper by Mr. J. B. Tyrrell upon Suctoria. This gentleman has by taking up the systematic study of these insects and the Acaridæ, already done important work in Canadian entomology. It is upon these tribes particularly that the student has difficulty in finding information. A paper upon Canadian Phosphates by Dr. G. M. Dawson will be read with interest by many. There are also papers on the Fossils from the vicinity of Ottawa, by Mr. Henri Ami; on the Sand Plains of the Ottawa, by Mr. E. Odburn; and the Deer of the Ottawa Valley, by Mr. W. P. Lett. These papers are followed by the reports from the leaders in the several branches of Geology, Botany, Conchology, Entomology, Ornithology and Zoology. The plan adopted in this Club of having the work divided up

into separate branches under leaders, who are responsible for the successful working of the department under their charge, is an excellent one, and might be copied with advantage by other similar organizations.

Seventh Yearly Report on Injurious Insects in England; by Eleanor A. Ormerod, pp. 98, 8vo., London, 1884.

It is always a pleasure to read Miss Ormerod's reports; but that for 1883, which has just come to hand, is of particular interest to all engaged in the study of injurious insects in Canada, from the fact that it treats of many of the same and closely allied species which are now attracting attention in North America by their depredations. During the past season an enormous amount of damage has been done to our crops by the Fly-maggots, or the larvæ of Diptera. Unhappily very little is known of the life histories of these insects. Miss Ormerod is one of the few who have done valuable work in this line, and she is still directing special attention to them; she asks for information and records of observations which may elucidate some of the unknown stages of their existence. A suggestive fact is drawn attention to, in the presence of the grubs of various kinds which infest root and other farm crops, being also found in manure, and thus carted on to the fields. This important discovery opens up a new sphere where valuable work may be done by Canadian economic entomologists and agriculturists. On this continent undoubtedly one of the chief causes for excessively severe attacks by insects is the abundant food supply provided by the large areas of the same crop under cultivation at one time, and our insect visitations have, from this cause, been generally more disastrous than in Europe; we have thus the advantage (perhaps somewhat doubtful) of greater opportunities for thoroughly investigating them. There is no doubt that interesting results will follow if the same insect be simultaneously examined in America and Europe, and exact notes be taken of all the different stages for subsequent comparison.

A fact which must have struck every one as peculiar is the small amount of systematic work which has been done in Europe, and particularly in England, in the study of injurious insects. With the exception of the Phylloxera in France, no investigations of any importance are recorded until the last few years. Curtis's magnificent work, "Farm Insects," is of course known to all, and until Miss Ormerod began her series of yearly reports, was the only work the farmer had to refer to, and even this from its price was inaccessible to many who needed it most.

These reports are issued annually at a very low figure (the present one being one shilling and sixpence) and are besides forwarded free to all contributors. In them is given a record of the insects which have been most noticeable during the period which each one covers, and together with a plain and easy description of each species, and figures of many, precise instructions are given as to the best remedies and the means of employing them. The talented authoress must be congratulated on the skill she has displayed in treating her subject. While scientific exactness and precision have been maintained, the different insects have been described in such a manner that any agriculturist into whose hands the reports may come will be able to recognise his insect foes with ease. The knowledge accumulated during the previous year is arranged under the heads of the different plants infested, after the same convenient plan as that followed by our worthy President in his invaluable work, "Insects Injurious to Fruits."

In the report before us we have an account of observations on insects attacking the apple and pear, the cabbage and turnip, with special mention of some *Anthomyians*, from which we also suffer, and concerning which it would appear that the attack is worst where rank, fresh farm manure is used, and that the best remedy is gas-lime. We then have carrot and celery insects, also a long account of the pests attacking cereals and grasses, of which the Crane Flies (Tipulæ) seem to have been the worst depredators, followed by the Wheat Midge *(C. tritici)* and Wire Worms (Elateridæ). Some insects which more or less attack the gooseberry, raspberry and strawberry, are treated of, and under mangold wurzel we find an account of the Beet Fly, *Anthomyia Betæ*, which has been very prevalent in Canada during the past season, attacking the leaves of the beet-root by burrowing large unsightly burrows beneath the epidermis. Under onion we find an account of another of our too well known enemies, the Onion Fly *(A. ceparum)*, and the simple remedy of keeping the bulb well covered by earthing up is recommended. The Hop Aphis, which has been the cause of very heavy expenditure in England during the past summer, is treated separately in an appendix which had been distributed sooner than the general report, so as to elicit as much information as possible at the time when it would be most useful. In addition to the above there are articles on False Wire Worms (Julidæ), which had been found injurious to beans; and on Slugs (Limacidæ), which eat everything, and lastly, there is an attack on that poor, but self-assertive scape-goat, the English Sparrow.

Although it is acknowledged by all that the quality and quantity of the agricultural produce of any country is an enormous influence affecting its prosperity as a whole, and notwithstanding that there is no cause which so materially lessens this supply as the ravages of noxious insects, yet we cannot find that the English Government has done anything to encourage or foster this or similar efforts, even though there are such vast interests at stake. It is, however, pleasing to find in the preface to the report under consideration, an account of an important experiment which has been tried at Aldersey Grammar School, situated in the heart of an agricultural district in the County of Cheshire, as to the possibility of teaching boys as much entomology as is needed for common farm use, without interfering with their other studies. This experiment has now been tried for three years, under the efficient direction of the Head Master, Mr. W. Bailey, with the co-operation of Miss Ormerod, and the results have been most satisfactory. The boys received a course of lessons on insect life, illustrated by living specimens and diagrams; they also collected and bred, so as to watch through their different stages the injurious insects of the neighborhood, and by this means soon became acquainted with the common types. "In fact, *the* great step was made; by the simple but sound method of teaching pursued, the boys had learnt to know *the crop pests* by sight, without doubt or mental worry, just as they knew *the crops* that the insects infest." J. FLETCHER.

Montreal Horticultural Society, Ninth Annual Report, pp. 154, 8vo., Montreal, 1884.

This pamphlet contains much interesting and valuable information for horticulturists. "Notes on the Trees and Shrubs of Northern Japan," by Prof. D. P. Penhallow, gives a list of the most useful trees of those islands and compares them with some of our own species, with a view to suggesting which might be successfully cultivated in Canada. A most important paper is contributed by Mr. Chas. Gibb on the Russian apples imported by the U. S. Dept. of Agriculture in 1870. Descriptions, and in many cases, good illustrations, are given of the best sorts of these valuable apples, and Mr. Gibb here supplies that authoritative information which is needed in reference to those Russian apples likely to prove suitable to our climate. "The Cultivation of the Cabbage," by Mr. R. Brodie, jr., gives the best varieties, and the best way to grow them on the Island of Montreal. In addition to these papers, there are reports from judges and from four local branches of the Society.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., SEPTEMBER, 1884. No. 9

SCOLYTUS RUGULOSUS IN BRANCHES OF PEAR TREES WHICH WERE KILLED BY PEAR-BLIGHT.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

During the years 1882-4, large branches of young pear trees in Cambridge, Mass., were killed by pear-blight. The next year other branches were affected and killed, and finally the whole tree succumbed. All trees had been in good and healthy condition. The branches were more or less densely covered by a Coccid, determined by Prof. J. H. Comstock as *Chionaspis furfurus* (A. Fitch), described and figured in his Report for 1880, p. 315, pl. 17, f. 1. The Professor thinks it much more probable that the branches were killed by the Scolytid (directly to be mentioned) than by the Coccids, and I believe this opinion is justified by the fact that other pear trees and apple trees near by are also covered by the same Coccid and are nevertheless in a healthy condition.

The branches were densely inhabited by a Scolytus, which Dr. G. H. Horn determined as *Scolytus rugulosus* Ratzeburg. I was able to compare the beetle with specimens from Germany, which proved to be identical. The species was first mentioned by Dr. J. L. LeConte as introduced from Europe into the U. S., Proc. Amer. Philos. Soc., vol. xvii., p. 626, No. 79. The specimens were received from Elmira, N. Y., attacking peach trees. His collection contains, besides those from Elmira, N. Y., several specimens from Hillsboro, Md. Prof. Chas. V. Riley informs me that he has ready for publication an extended article, with illustrations, upon *S. rugulosus*, and drew my attention to his note in the N. Amer. Entom., 1880, vol. iii., p. 298. The beetles were sent by Mr. J. L. Bennet, Red Bank, N. J. They had for several years destroyed all cherry, peach and plum trees set out on a particular lot at Fair Haven. They did not appear to injure seed fruit as yet, and are confined to a small section. They bore little holes in the trees, which holes fill with gum, and the tree soon dies. Mr. H. Boyè, Coopersburg, Pa., communicated that the same beetle had so profusely stung a young cherry tree, trunk and branches, that it will not recover. Prof. Riley has received it from Hills-

boro, Md., and from Williamsport, Md., where it attacked the peach, and from the District of Columbia. As far as known to me, the N. American literature contains nothing more concerning this beetle.

In Europe the beetle is first quoted by F. Sturm (Catalog. meiner Insecten Sammlung, 1826, p. 194), with the manuscript name, *Scolytus haemorrhous* Megerle. In V. Kollar (Naturgeschichte der schaedl. Insecten, 1837, p. 270, and English transl. p. 263) the co-editor, J. Schmidberger, gives about the best account in existence of the beetle and its habits, with the same name, *S. haemorrhous*. Professor Ratzeburg, 1837, Forstinsecten, vol. i., p. 187, and Ed. ii., 1839, p. 230, gives in a note a description with the name *Eccoptogaster rugulosus* Koch, and quotes as synonym, *Scolytus haemorrhous* Ulrich. A good figure of the beetle is given pl. x., f. 10, and of the craddle and galleries in the bark, pl. 17, f. 4. The name Ulrich is explained by Schmidberger's statement that the beetle had been determined for him by Mr. Ulrich as *S. haemorrhous* Megerle, and the article begins with this full name of the beetle. The name Koch, used by Ratzeburg, is a manuscript name. Mr. Koch, probably a student of the Professor, has nothing published. Nevertheless the beetle has been often quoted as *S. rugulosus* Koch, and only in later years as *S. rugulosus* Ratzeb. I do not understand why Ratzeburg has not adopted Schmidberger's name. That he has known this publication (though of the same year) is proved by the quotation of Ulrich's name. I am not able to see Schmidberger's work (Beitraege zur Obstbaumzucht und zur Naturgeschichte der—schaedlichen Insecten, 1827 to 1836), which probably contains the same statements as in 1837. The description by Ratzeburg without the figures would not allow a surer determination than those of Schmidberger, who gives besides a full history of the life and habits of the beetle. During the following time the literature on *S. rugulosus* is large. I have compared Noerdlinger, Letzner, Chapnis, Eichoff, Chapmann, Schmidt-goebel, for the observations on its habits. It attacks the branches, and often mere twigs, of living trees belonging to the genera *Pyrus* and *Prunus*, in great numbers, so that the infested part of the tree must perish, because it cannot continue to grow with injured bark and strongly pierced sap-wood. It appears to multiply very fast, and a double brood is supposed to occur. A few females laid so many eggs that the larvæ produced from them destroyed the bark of the stem, nearly a foot long. They cannot easily be eradicated, or at least diminished in numbers, but by removing and burning the trees attacked by them.

As I believe it to be unfair to anticipate knowingly a communication which is near its publication, I would only give a short notice of some facts which may perhaps serve Prof. Riley in bringing to the front, at least for the cases observed by me, the connection of pear-blight with this beetle. The twigs were attacked about two feet above their origin out of the trunk, where they are about two inches thick, and higher up to half an inch thickness. The next year, if the dead branch is not removed, the beetle goes further down. The craddle is perpendicular in most cases, except where it begins just below the base of a bud, and is about an inch long. The galleries are to four inches long, and rather deeply injuring the sap-wood. The hole for the pupa goes deeply, to 4 millim., in the wood. I have observed the beetle only in pear trees, but I possess it from Europe on *Prunus domestica*.

I know Mr. F. J. Burrill's papers in Proc. A. Ass. 1880, p. 583, and Amer. Nat. 1881, vol. xv., p. 527. I failed in trying to repeat his observations, what I consider of no importance against Mr. Burrill's conclusions, as just such observations need a trained skill not at my command. But I know that other scientists perfectly trained for such observations have also failed. As bacteria are everywhere to be found, we will have to wait for other reaffirming observations before we are able to accept Mr. Burrill's views. I should add that I am acquainted with the older literature on pear-blight, and with the different hypotheses about its causes.

HISTORY OF THE PREPARATORY STAGES OF PHYCIODES PICTA, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Sub-conic, truncated, the top convex, the upper part from one fourth to one third the length marked by low vertical ribs, about 24 in number; below these the surface is shallowly and irregularly indented; top similarly indented, convex; color when laid yellow green. Duration of this stage about five days.

YOUNG LARVA.—Length .04 inch at 12 hours from egg, cylindrical, each segment a little rounded; color yellow-green; a few long black hairs spring from minute black tubercles; these are in longitudinal rows, two being dorsal, and two sub-dorsal (one on either side); these rows run

from 5 to 13 inclusive, the dorsals placed on the front of each segment, the sub-dorsals on the posterior part, and all are turned forward exeept on 11, 12, 13; between these rows on either side from 4 to 12 is a very short hair on the posterior end of each segment; the number and arrangement of hairs on 2 to 4 is different from that of the succeeding segments; 2 has a chitinous dorsal patch, long oval, on the front of which are six long hairs bent over the head, and on the rear are four straight short hairs turned back; below are four short hairs to foot, one above, one below spiracle in vertical line, and two near together before the spiracle; 3, 4, 12 have each a straight cross line of long hairs, four on either side the dorsal line and down to middle of side, part of these being in the dorsal rows before spoken of; below spiracles on 5 to 12 are two short hairs to each segment, the posterior one always a little higher than the other; and a row of short hairs along base, one to each segment from 2 to 13; head sub-globose, rather broader than high, slightly depressed at top, the vertices rounded; color black, smooth; with a few short fine hairs. To first moult about five days.

After First Moult.—Length .13 inch at 12 hours from moult; color all dull yellow-green, with a brown band on upper part of side from 2 to 12; armed with longitudinal rows of spines, of which seven are large, one dorsal and three on either side, besides a row along base of much smaller size—in all nine rows; these spines are concolored with the body, long, slender, tapering, thickly beset with short hairs, the whole forming a dense covering; on 2 is a chitinous dorsal patch from which spring many black hairs, the front ones long and falling over the head; under side, feet and legs yellow-green; head obovoid, the top considerably depressed, the vertices rounded; color black, smooth, with many black hairs. Duration of this stage three days.

After Second Moult.—Length .18 inch at 12 hours; color yellow-green; a faint brown line runs with the dorsal, and another just inside each sub-dorsal row of spines; a dark brown band on upper part of side from 2 to 12, and on this the tubercles and spines are brown; all others greenish-yellow; head as before. To next moult five and six days.

After Third Moult.—Length .24 inch at 12 hours from moult; scarcely different from last stage described; the brown lines on dorsum more distinct; the black band as before, as are all tubercles and spines. To next moult five days.

After Fourth Moult.—Length .36 inch at 12 hours; color in June dark brown, dotted with sordid white on dorsum; in October more white on dorsum than brown, the white sordid, the brown restricted to lines or narrow stripes, one of which runs with the dorsal spines, and one just inside the base of each upper lateral row; in both a whitish stripe runs with the upper laterals, and next under that is a broad dark brown band, in the summer larva, darker or more blackish than the dorsal color; under this band, in June, is a broad brown space much dotted and mottled with whitish, and next a basal whitish stripe; in the October larva the lower part of side is sordid white, mottled with pale brown to the yellow-white basal stripe; the June larva is more brown than white, the October larva more white than brown. To next moult in June about nine days, in October thirteen days.

After Fifth Moult.—Length in July .42 inch at 12 hours; as in previous stage in same month, except that the side below the dark brown band is lighter, more white, less brown.

MATURE LARVA.—Length .6 inch; cylindrical, even, armed with seven principal rows of short stout tapering spines, one dorsal, three lateral; the five uppermost rows thickly beset with short stiff brown hairs; the lower row with fewer, and these are yellowish; besides these is a row of small, similar spines over feet and along base; in June the spines are light brown, or yellow-brown in the five uppermost rows, the others yellowish; in October the spines of all the rows are yellow-green, from yellow bases; color of dorsum in June brown dotted with whitish; a narrow whitish stripe runs with the upper lateral spines; next under this and extending to the lower edge of middle lateral row is a dark brown band, a little dotted with whitish, from this to the whitish basal stripe the side is pale brown, dotted and mottled with whitish; in October the dorsum is yellow-white, with three pale brown stripes, one mid-dorsal, one just inside each upper lateral row of spines; the band as in June, but chocolate-brown; the lower part of side nearly white, the two or three anterior segments mottled with pale brown; on 2 is a black chitinous dorsal oval patch, from the front of which black hairs bend over top of head; under side, in June, greenish-brown, in October, yellow-green; feet and pro-legs concolored with under side; head cordate, the vertices rounded, shining dark brown; most examples have a yellowish bar on each vertex from back to front; in some this is partly or altogether want-

ing; surface much covered with long bent black hairs. From last moult to pupation nine days.

CHRYSALIS.—Length .36 to .4 inch; shape of P. *Tharos;* abdomen swollen, anterior parts narrow; head case transversely compressed, the top rounded, corners rounded, sides excavated; mesonotum rounded, not carinated, rather prominent, followed by a shallow depression; the wing cases slightly raised at margins; color uniform yellow-brown; or the wing cases, head and mesonotum are yellow-brown, a dark brown patch on either side of mesonotum toward the front; the abdomen mostly dark brown, mottled a little with yellow-brown; two yellow-brown sub-dorsal stripes from the length of the abdomen, and two others sub-vertical; no tubercles apparent; surface granulated. Duration of this stage about seven days.

This pretty species flies in Colorado, abundantly in the southern part; also in New Mexico and Arizona, and more or less in Nebraska. Mr. Nash obtained eggs by confining the female on Aster and also on Alfalfa. They are laid in clusters, as with the other species of this genus. I received from Mr. Nash, at Pueblo, So. Colorado, two clusters of eggs, 11th June, 1884. They began to hatch a few hours after arrival. There were about 75 eggs, in some parts three deep. On 18th came another lot of larvæ just hatched. I gave them leaves of various species of Aster. In all respects their behavior was like that of *Tharos*, and they are as hardy and as easy to rear. The first chrysalis formed 9th July, and the butterfly came from it 15th July. On 21st August I received from Mr. Nash another lot of larvæ just hatched. These passed first moult 27th, the second 30th, the third 4th Sept.; after this they eat little and I supposed would hibernate; but one passed 4th moult 27th Sept., and the rest passed same before 4th Oct. One passed the 5th moult 11th Oct. Up to this time the weather had been warm, but on 16th to 18th Oct. the nights were cold, nearly at frost, and the larvæ went into lethargy. These fall larvæ differ considerably in color from those of mid-summer, being lighter, less brown, as I have set forth in the description. On 6th June, 1884, I received one larva from Mr. Nash, which must have hibernated. It was .4 inch long, and past third moult. On 15th passed fourth moult, and 25th passed fifth moult, but died without disclosure of imago. There would seem to be two annual broods of the species at Pueblo. The female of *Picta* was described as *Canace*, Tr. A. E. Soc. 3, 206, from Arizona. The male described was taken in Nebraska by the late Mr.

James Ridings in 1864 (Proc. Ent. Soc. Phil. 4, 201). The female is larger than the male and much more inscribed on under side. This species does not seem to be seasonably dimorphic, as are *Camillus* and *Tharos*, but the early and late examples are of the same pattern of marking.

ON THE COURTSHIP OF THE SEXES IN ŒDIPODA CAROLINA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

For several seasons past, along in the latter part of summer (August and September) I have noticed certain peculiar actions on the part of the large flying locust, *Œdipoda carolina* Linn. I have always suspected that these actions have something to do with the union of the sexes. In the warm parts of the days at this time of the year individuals of this species may frequently be seen rising from the ground, and, hovering several feet in the air, rapidly vibrating their wings and making a peculiar flapping or beating sound, the while keeping nearly the same relative position in space. Although my notes on this subject are rather imperfect, I think they may be of use. I can not find that the subject has ever been touched upon before; such may be the case, but I have not been able to discover record of it in any reports, periodicals or works on insects. Still these actions must have been noticed by observers, as they are of common occurrence.

On the 14th of August last, in the afternoon, I saw one of this species fly up from the dry parched grass, and remain nearly stationary about two feet in the air for some time, by means of a rapid beating of the wings. Presently it flew back to the ground. In a few minutes another one, which had witnessed the performance at a short distance, flew quickly over and alighted by the side of the performer. They ran by each other several times, occasionally touching each other, but did not make any further manifestations, and finally the last one flew away, leaving the other motionless in the withered grass. Though it is probable that the females are attracted by these performances of the males, and that the males vie with each other in their exhibitions, still I think that the two just spoken of were both males and were disposed to fight from a feeling of rivalry, the one that flew off having been beaten. On the 24th of the month I noticed

the same thing over again. An individual performed three times in succession, and then another alighted on the ground by its side; they ran by each other several times, apparently clasping, probably in conflict, for I am quite sure they were both males. At last one of them flew away, and the other soon after renewed the performing. I regret to say that I did not capture specimens to ascertain the sex; but, judging from size, I do not think I have ever seen any but the males taking active part in these aerial exhibitions. In going through with the performance they rise at first generally about three or four feet, making a light purring or beating sound, and then, rising higher, change the motion of the wings, when a curious, sharp, see sawing sound is produced. Some rise even higher than six feet in the last act; others rise only one or two feet. Of course some excel others in the beauty and ease with which they accomplish the feat; many do not remain in just the same place while hovering, but vary, falling or jerking about while endeavoring to keep the same point in the air. I am of the opinion that the females are sensitive to the grace with which this is performed.

THE CROTON BUG IN QUEBEC PROVINCE.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

One morning last November I went to the Chaudiere Curve, to meet the train from Halifax, which had been delayed for some hours. I found two men in the waiting-room who had spent the night there. They complained that swarms of black beetles had troubled them all night so that they could not sleep. Upon my questioning the correctness of the statement, they said, "Well, here they are in all the cracks," and they forthwith commenced to poke the creatures out. The insects were numerous enough, but they were not beetles, nor were they black. They were specimens of the German Cockroach, *Ectobia Germanica*. I afterwards enquired of one of the railway employes as to the time of the first appearance of the insects. The man told me that he first noticed them in 1882. I asked if they had appeared anywhere else in the neighborhood. "Yes," he answered, "in my own house last winter; but," he added, "I am not there in the day time, so I left the windows open and froze them out."

The enquiry is interesting, How did *Ectobia Germanica* get to the Chaudiere? At that place, which is nine miles from Point Levi,

luggage is transferred from the Grand Trunk to the Intercolonial, and *vice versa;* and the creatures might have been brought by American tourists from Boston (where it abounds), or by immigrants from Germany, or other parts of Europe. The latter supposition is the more likely, inasmuch as the immigrants far exceed the tourists in number, and also are of a different class—a class less likely to be careful as to their properties and equipments. No doubt the "bug" was carried to Boston by immigrants. It is not a "Yankee invention."

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Pursuant to notice, the members of the Entomological Club of the A. A. A. S. met at 2.30 p. m., September 3, 1884, at the Hotel Lafayette, in Philadelphia. Present: Herbert Osborn, Ames, Iowa; Dr. John G. Morris, Baltimore; Dr. G. H. Horn, Dr. Henry McCook, Eugene M. Aaron, E. T. Cresson, Philadelphia, Pa.; C. H. Fernald, Orono, Maine; Rev. G. D. Hulst, John B. Smith, E. L. Graef, Brooklyn, N. Y.; C. V. Riley, B. P. Mann, Washington; J. H. Emerton, G. Dimmock, Cambridge, Mass.; L. M. Underwood, Mr. Larkin, Syracuse, N. Y.; Dr. P. R. Hoy, Racine, Wis.; Wm. Saunders, London, Ontario; J. A. Lintner, Albany, N. Y.; Dr. Maclosky, Princeton; Dr. Harte Merriam, Locust Grove, N. Y.; H. H. Lyman, G. J. Bowles, Montreal; Prof. Martin, Messrs. Moore, Hunt, Casey, Wenzell, and others.

In the absence of the President, D. S. Kellicott, of Buffalo, N. Y., the Vice-President, Herbert Osborn, was called to the chair. A letter was read from Mr. Kellicott, regretting his inability to attend.

The election of officers was then proceeded with, and resulted as follows:—

President.....Dr. John G. Morris.
Vice-President.....Herbert Osborn.
Secretary.....John B. Smith.

Dr. G. H. Horn made some remarks on the historic associations connected with the spot where the present meeting was held. Many years ago when this site was far out of the City of Philadelphia, the Museum of

Natural History was there erected, and in the corner occupied by Parlor C of the hotel, stood the skeletons of a horse, ox or other large mammal. Here Thomas Say, poor in pocket, though rich in brain, having no other place to go, put up his bed under these skeletons, and that for many months was his only home; there also he contracted the illness which eventually caused his death.

The Secretary then read a short paper by D. S. Kellicott, as follows:

A NOTE: OVIPOSITING APPARATUS OF NONAGRIA SUBCARNEA.

At the Minneapolis meeting of this Club, I read a note on the life history of this species, the substance of which, together with a brief description of the moth, has since appeared in the *American Naturalist.* Since then I have ascertained how the eggs are placed and protected through the winter, and have examined somewhat the structure of the egg-placing apparatus. I have submitted an account of this moth to the Publication Committee of the Buffalo Society of Natural Sciences, from which I am permitted to extract the following remarks. I enclose also a tin-type of the drawings accompanying the paper mentioned, together with a fragment of a *Typha* leaf with the edges rolled over rows of eggs.

Figure 2 represents the ovipositing apparatus as seen from one side and below. Explanation is scarcely necessary. The last two abdominal joints are strangely modified, constituting a complex apparatus. The last joint is laterally broad, chitinous, except at base, terminating in two finger-like processes *(c);* these are rounded at the apices and curved downwards as represented in the drawing; at *b* are two concave discs with a deep groove *(g)* leading up to the anal orifice; it is evidently along this channel that the eggs are passed by the ovipositor; on either side and below the groove there is a strong chitinous ridge with saw-like teeth pointed backward *(e).* The other modified ring consists of a heavy hard band *(a)* with stout posterior processes for muscular attachment; below are two stout chisels *(d)* pointing backward and overlapping the first basal teeth of the "saws" of the last ring.

I have not succeeded in witnessing the act of oviposition. Numerous females were kept in an abandoned aquarium with *Typha* leaves, and the same watched faithfully; it was approached by day and by night, but all were concealed and quiet whenever observed. Day by day I could find additions to the stock of eggs, but the manner of performing the delicate operation of folding over and cementing down the leaf edge, forming a

secure tube for the eggs, I was not permitted to see. The eggs laid in September remained unhatched in the tubes until spring.

Fig. 3 of the tin-type represents the remarkable frontal "spine" of the moth, by means of which it rips open the pupa cell in the stem of the *Typha* and escapes. Fig. 4 represents the same of *N. typhæ*, and fig. 5 that of *N. subflava*. That of the last is hardly bilobed; under an inch objective, however, the apical notch appears. Only one examined.

The tin-type showing the structural details was examined by the members.

Mr. J. B. Smith said that the clypeal modification referred to was not peculiar to this species, but was shared by all others of the same genus. Clypeal modifications were very common throughout the Noctuidæ; indeed almost universal in species living in the stems of plants where the insect had obstructions to overcome in emerging from the pupa.

Mr. Smith exhibited six large photographic plates of *Agrotis*, illustrating a large number of species, and made some remarks on the great structural variability of the group *Agrotis*. Fully 26 groups based mostly on structural characters were indicated. Spinulation of tibiæ, structure of front, vestiture, form of wings, antennal structure and general habitus, all are variable, and so gradual are the gradations that generic types can not be well founded on them. The plates were examined by the members, and it was agreed that they were fine specimens of the photographer's art as applied to this branch.

Dr. Morris asked whether the tendency had not been of late to an unnecessary increase of genera in all orders.

Mr. Smith said that as to the Noctuidæ undoubtedly genera were based upon apparently insufficient characters, but less so than in Coleoptera.

Dr. Horn said it was a principle long since laid down by Lacordaire that characters scarcely of specific value in one group formed excellent bases of even higher divisions in others; in his view genera are established for convenience merely and have no existence in nature. Nature has only species, and genera were simply useful in dividing the mass of species to facilitate recognition. However, of late, as new material was becoming more scarce, persons seized with the *mihi* itch were taking to describing genera; for some 12,000 species of N. A. Coleoptera, fully 2,000 genera were described.

Dr. McCook said that in ants and spiders there is plenty of opportunity for persons afflicted with that itch, as there was a very large un-

worked field there, and plenty of new forms. About 200 species (American) are thus far described. Of spiders a somewhat larger number.

Mr. Emerton said there were some 400 described species, and that naturalists generally had no idea what a very great variety of spiders really existed.

Mr. Mann read a letter from O. S. Westcott, of Maywood, Ill., suggesting the formation of a stock company for the purpose of publishing an American entomological journal, and after a lengthy discussion the question was referred to a special committee consisting of Messrs. Mann, Osborn, Horn, Aaron and Smith.

Prof. Fernald presented an invitation from the Agassiz Association, received by him, inviting the members to be present at a lecture by Dr. McCook, in Franklin Institute this evening. This invitation was accepted by the Club.

Prof. Fernald then asked for the opinions of the members on the following points :—

1. Where a name has once been published by an author, shall we change the mode of spelling to one more consistent with the derivation? e. g., Treitschke, Schmet. viii., established the genus *Cochyilis.* Shall we adopt his spelling, or the more correct *Conchylis?*

Dr. Horn said he would not change it; that generic names are mere aggregations of letters representing a living thing, and that at least one well known entomologist habitually formed generic names by coining words without any meaning whatever, merely with a Grecian sound, and generally euphonious. If such names were accepted, so should misspelled names be. Some purists would make every name correspond with its origin, and it had been proposed to change the well known and universally accepted term, *Bembidium*, into *Bembicidium;* this was displaying learning without adding to knowledge.

Mr. Mann agreed with Dr. Horn. Dr. McCook thought a manifest error might be corrected, but would not make the correction if thereby an author's right of priority were destroyed, i. e., if the name thus changed were pre-occupied at the time it was originally proposed.

2. When an author once publishes a name which is manifestly incorrect in orthography, and in a later work corrects his own error, shall we adopt his correction? e. g., Treitschke published the genus *Pendina*, but later corrects it to *Penthina.*

Dr. Horn thought that where the derivation of a name was stated, a manifest error might be corrected by the author, but it would depend somewhat upon how general the use of the name had become; he was inclined to adhere to the name as originally written.

Mr. Mann also thought it would depend upon how much the name had entered into use. If it had not become known or used as erroneously written, and the author's correction was made in a reasonable time, it should be adopted.

3. Should the termination of the specific name be made to agree with the generic in gender? e. g., Zeller and some others write *Tortrix viridana*, *Exartema permundanum*, and *Lophoderus ministranus*. Shall this rule be adopted, or shall we adopt the ending *ana* irrespective of the gender of the genus?

Dr. Horn said that in Coleoptera the rule was that specific and generic names should agree in gender, and he thought the rule should be universal. Where, however, a termination had some special signification, where it indicated the group to which the species belonged, there, if it had come into general usage, he would favor uniform terminations.

Mr. Mann did not believe in uniform terminations.

4. When a Tortricid species is described with a name not ending in *ana*, should this be changed to *ana*? e. g., *Carpocapsa pomonella* Linn. Prof. Fernald himself was opposed to such a change. Dr. Morris suggested that Linne's names be left as he made them.

5. To what extent should the law of priority be made use of? Shall we make use of the oldest name, even if the species has been known under another for a long time? If not, for how long a time must a name universally or generally be in use to take precedence over an older name?

The sentiment of the meeting was strongly expressed that so much discussion without agreement had been hitherto had on that question, that no universally accepted conclusion could be reached.

6. What should be taken as the starting point in nomenclature? Some have taken the 12th Ed. of Linne's Syst. Nat., while others have taken the 10th Edition.

Dr. McCook thought the rules heretofore adopted by the British Association covered that point in favor of the 12th Edition.

Prof. Fernald replied that many of the subscribers to that rule had now changed their opinions on that point, and had taken the 10th Edition as a starting point.

Mr. Smith said, the Noctuidæ alone considered, it made no practical difference which edition was used, and so far as Tortricidæ were concerned, he did not think that any practical difficulty would arise, whichever edition was used.

Prof. Fernald expressed surprise that so much discussion should have arisen over Hübner's works, and that his names should have been so universally rejected, while Guenée's names in the *Index methodicus*, unaccompanied by a word of description, were recognised and used without question. Hübner at least gave some sort of definition to his divisions, genera or *coiti*, so called.

Dr. Horn suggested that there might be some analogy to the cases of Erichson and Motschulsky; both of these had created some genera, not, or incompletely described, but while Erichson's genera had been universally adopted, those of Motschulsky had been as universally discarded. The reason was, Erichson's genera usually meant something and had some solid foundation, and he himself had credited to Erichson some genera first described by him (Dr. Horn) under the names proposed by Erichson. Motschulsky's genera, on the contrary, were based upon the flimsiest characters as a rule, and had no value whatever.

Mr. Smith said that as to the Noctuidæ at least, the parallel would hold. Hübner's genera were very largely devoid of all foundation, while Guenée, as a rule, made pretty good genera and mostly described them.

Prof. Fernald thought this not true of the Tortricidæ; that quite as many names of Guenée were baseless as of those proposed by Hübner.

Mr. J. H. Emerton announced that the types of a large number of the species described by him in his work on the "New England Spiders of the Family Theridiidæ," and all the types of a paper now in press, were at the Academy of Natural Sciences, and he would be happy to exhibit them to any who would make an appointment with him for that purpose.

On motion, the meeting was adjourned until 2.30 p. m., Sept. 4th, to meet then at the Entomological Rooms in the Academy of Natural Sciences, the use of this room having been offered by Messrs. Horn and Aaron on behalf of the A. E. S.

Pursuant to adjournment, the Club met at the rooms of the Am. Ent. Soc. at 2.30 p. m., Sept. 4th, Dr. Morris in the chair. The minutes of the previous meeting were read and adopted.

The committee appointed at the last meeting reported that they did

not consider that the scheme proposed by Mr. Westcott for the publication of an entomological periodical, a practicable one for the Club to undertake.

Mr. Smith gave an account of the secondary sexual characters of the Noctuidæ, illustrated by blackboard sketches, showing peculiarities of leg structure in the male butterflies and some analogous variations in the Deltoids, in which latter group the tibiæ often become aborted, while the first tarsal joint is often so abnormally developed that it is usually mistaken for the tibia. The peculiar brushes of the fore legs were noticed and some modifications commented on. The abnormal development of the last tarsal joint of *Palthis* was illustrated, as was also the peculiar palpal structure of the ♂ of that genus ; so of antennæ, the peculiar bends and tuftings of the ♂, especially of the group *Herminiinæ*, were noted, as were the more usual pectinations. In conclusion, Mr. Smith mentioned the varying practice of systematists as to what generic value these characters should have. In some instances these male characters were wanting, while in all other respects the species agreed with others in which all these peculiar structures were well developed ; on the contrary, occasionally a species would be found which offered some peculiar character in the ♂ not usually found in its near allies, instancing *H. paradoxus*, in which the ♂ has a pellucid impression in the fore wing, around which the venation is somewhat modified. What shall we do with such a species? The ♀ well fits into *Heliothis*. Shall the ♂ then authorize a genus where the ♀ offers no basis for it? Students of other groups should give their experiences.

Prof. Fernald said that in the Tortricids, generic, and even higher value, had been given to these characters. The costal fold was a prominent ♂ character, abnormally developed in many exotic forms. In a South India form it extends fully two-thirds across the wings, while in other Indian and Japanese species it is very wide, but not so abnormally developed. Families have been based upon these characters, and one genus has been based upon a character peculiar to the ♀ only. This genus he thought would have to be abandoned.

Dr. Horn said that in systematic work and in characterizing a species both sexes should be considered. It requires two individuals, a ♂ and a ♀, to make a single complete example of a species, and classification should consider these individuals together in assigning positions to them.

Synoptic work has a higher purpose than a mere aid to a recognition of species.

Prof. Fernald was interested in Dr. Horn's view of the case; he had been interested in the view that nature had no genera, but species only. For his part he thought he would be satisfied if he had a good definition of a species.

Dr. Maclosky said that birds sometimes offer remarkable differences in sex, and species can be distinguished only by a reference to both. The flickers, for instance, of the two sides of the continent were very distinct, but in some intermediate localities the species approached so closely that it was difficult, if not impossible, to distinguish the females, while the males were separable. There was no anatomical difference between the species, but he thought there must be physiological characters not yet discovered which separated them.

Dr. Morris thought it a curious classification that would place male and female in different genera if separately considered.

Mr. Osborn read a paper on *Mallophaga* and *Pediculidæ* of N. A., illustrated by drawings of specimens and slides containing specimens mounted for microscopic examination. (This paper will appear separately in the C. E.)

Miss Cora H. Clarke exhibited a specimen of the work of some Caddis Fly larvæ *(Hydropsyche)*, consisting of an aggregation of mud cells on a small stone, beyond which were the nets spread by the larvæ. They were always found in running water, and always had an opening toward the current, probably to enable the larva to catch the food coming down the current. In reply to a question from Dr. Morris, Miss Clarke said the nets were often solitary, but not unfrequently aggregations were found. Another species, of *Plectrocnemia*, builds a vertical tube of mud, sometimes with a number of branches; a specimen was exhibited. Dr. Hagen thinks it an undescribed form. Reference was made to figures in a paper entitled "Description of two interesting houses made by Caddis Fly Larvæ, by Cora H. Clarke." The larvæ living in running water were difficult to raise.

Mr. Mann remarked that *apropos* of raising larvæ living in running water, Prof. Barnard, of the Dept. of Agriculture, had contrived an arrangement with which he had great success with larvæ of that kind. It consists of a glass tube, the bottom closed by a porous cloth, the other

end fastened to a faucet; the water could be thus kept steadily flowing with any desired rapidity.

Dr. Morris exhibited a gall recently collected, the inclosed larva not bred, and asked for information as to the probable producer.

Mr. Mann said the subject of galls had puzzled him in his bibliographical work, especially as to the proper method of indexing them. He had referred to them under the head of systematic botany, but doubted his correctness.

Dr. Morris asked what orders of insects contained gall producers. Mr. Osborn thought about all orders except Neuroptera and Orthoptera. Mr. Smith said that at least one American species of *Apion* is known as a true gall producer, and in Europe several species are known to produce root galls. Mr. Osborn said that many plants, especially the *Rosacea*, were much subject to galls, while others were rarely if ever so infested. He thought them abnormal products so far as plants are concerned, and as rather belonging to insect economy since they are caused by insects; not only that, but insects were often most readily distinguished by the form of the galls, and in the case of mites those of the maple and ash were much alike, but produced very easily distinguishable galls.

Dr. Hoy thought the galls were pathological appearances, and were rather diseases of plants and should be classed as such. In descriptive botany they had no place, any more than in a description of the lips cancer should be treated of.

Mr. Mann stated he had also indexed them under pathological botany and under insects, but the chief difficulty had arisen through a descriptive paper treating galls from a botanical standpoint.

Dr. Morris said that he had seldom seen such a dearth of larvæ of all kinds, and butterflies were exceedingly scarce.

Mr. Saunders thought there had been no unusual want of insects in Canada. *Turnus* has been common, and so was *cardui;* the latter, indeed, had been extremely abundant in Manitoba, where it had destroyed large quantities of thistles, and caused great alarm on the part of farmers, who thought it would also attack their crops. *Thecla niphon*, usually rather a rare form, was found in some abundance this season, and in the early part of May quite a number of specimens were captured.

Dr. Hoy said that as compared with previous seasons, *cardui* has appeared in immense numbers, fifty for one. It had never previously to his knowledge attacked the hollyhock or sunflower. This season it has

litterally stripped the leaves from these plants, preferring them apparently to thistles. Other butterflies had been scarce.

Prof. Osborn said in Iowa butterflies had been unusually common.

Mr. Underwood said he had found butterflies unusually common in Central N. Y, *turnus* especially, but for five weeks spent in Conn. everything was scarce excepting *cardui*.

Prof. Fernald said in the first part of the season insects were very rare. Butterflies alone appeared about as common as usual, *turnus* unusually common ; *cardui* had been rare until this summer, when it was common. Last season Mrs. Fernald had collected both at sugar and at flowers cultivated because of their attraction to insects, and flowers had proved most productive ; this season the reverse has been the case.

Mr. Mann, referring to a remark made that cold winters were favorable to insect life, said that seemed to be the generally accepted theory now, and appeared borne out by facts.

Mr. Aaron said that everywhere insects are reported as exceedingly scarce. His brother from Texas so writes ; from Florida, Arizona and California come the same complaints. The remarks on the abundance of *cardui* reminded him of a saying of Mr. Ridings that he was always afraid of a season in which *cardui* was common, for then nothing else would be found.

Mr. Smith said he believed cold winters favorable to insect life, but this year there was not only a cold winter, but there were several very severe frosts late in spring, one as late as June 14th-15th ; it was rather these late frosts that were to be blamed for the dearth of insect life. On Cape Cod insects were unusually rare ; in Vermont, where hundreds of good insects were last year taken at sugar, scarcely one fourth the number of common forms were this year found.

Dr. Hoy said that in his vicinity, far north as it is, he has taken many insects usually considered southern—more than were taken on the east of the lake. There seems to be a northern extension of the thermal line on the west of the lakes. Last season he found four specimens of the black variety of *turnus ;* before only a single specimen had been found.

Mr. Saunders had never known this black variety to occur in Canada.

Dr. Merriam had found *turnus* in the central Adirondack region nearly as far north as Racine, three to four thousand feet above the sea. There were often hundreds at puddles, and among them many of this black variety.

Prof. Fernald reported the capture in Maine of a suffused form, partially yellow and part black.

Dr. Hoy asked whether all the food plants of *P. ajax* were known. He has found perfectly fresh specimens, and no pawpaw within 200 miles of the place. The butterfly is often common, but he has never found the food plant of the larva.

Mr. Larkin had noticed at his station south of Syracuse that insects were unusually scarce. The potato beetle even was very rare—not found at all in some fields. He had noticed that when they have winters that kill wheat, then usually the apple crop is good and there are few insects.

Mr. Aaron said in reply to Dr. Hoy's query, that *ajax* would feed on either spice-wood or upland huckleberry, as well as pawpaw.

Dr. Hoy said they had the huckleberry, not the spice-wood.

Mr. Osborn said he had seen *ajax* in Iowa where they had neither pawpaw nor the huckleberry, and he thought no spice-wood. He also reported a statement from Sioux City that there, *Chrysochus auratus* was so common that they were crushed under foot on the streets. Was not this unusual?

Mr. Mann said in the woods he had seen them piled in great heaps upon the stones.

(To be Continued.)

NEW CATALOGUE OF BUTTERFLIES.

We are glad to learn that a new edition of the Catalogue of the Diurnal Lepidoptera of America north of Mexico, by Wm. H. Edwards, is now in press and will shortly be issued. Since the last edition was published in 1877, a large number of new species have been described, and much information gained with regard to the geographical distribution of our butterflies. A work so much needed, prepared by so competent an authority, will be of great value to all who are interested in this department of Entomology.

CORRESPONDENCE.

Dear Sir: Mr. Lyman's objection to my statement of the size of *angulifera* is quite correct. No one could tell by it whether it was one inch or five in expanse of wing, and is only excusable from the nature of the communication, which was not a description of the insect, but only

the announcement of its having been found in Canada. I had the pleasure of several calls from Mr. Angus whilst he was on a visit to relatives in this neighborhood the latter part of the summer. The June No. of the ENTOMOLOGIST having just appeared, I gave it him to read. He said he had noticed in looking over my collection that the specimens of *angulifera* he had sent me were small in size and light in color; that they were bred specimens, which would account for that fact, and that he had full-sized insects in his collection. So that I presume that in nature *angulifera* will correspond in size with *promethea*, which is itself a rather variable insect, I having specimens ranging from 2¾ inches to 4½ in expanse; the Ridgeway specimen of *angulifera* being 4¼, whilst one of the N. Y. specimens is only 3½. I may mention that Mr. Angus said the caterpillar fed on the White-wood. J. ALSTON MOFFAT.

Dear Sir: I enclose a few lines from a letter received from Miss Annie M. Wittfeld, of Indian River, Fla., written 23rd Sept. last, showing one of the trials a lepidopterist is sometimes subject to.

Coalburgh, W. Va., Oct. 1, 1884. W. H. EDWARDS.

"Yesterday about day-break the weather was clear; about twenty minutes later a small black cloud arose in the south-east, and came along very fast, although with us there was a dead calm. We took little notice of it, till all of a sudden a terrible flash of lightning came down, followed instantly by a fearful clap of thunder and a puff of wind that took everything with it. It all lasted but a second, and then the sky was clear and calm again. Shortly after I went to the glass where I had had six full grown caterpillars of Limenitis *Eros* feeding, and I found them all dead and stiff. At the same time all my other larvæ, which were in wooden boxes, were unhurt."

OCCURRENCE OF THE BASKET-WORM IN ONTARIO.

Dear Sir: Some time ago Mr. A. H. Kilman, of Ridgeway, Ontario, paid me a visit, and brought some of his moths with him which he had collected at Ridgeway. Among them was one which I have no doubt was the imago of the basket-worm, *Thyridopteryx ephemeræformis* Haw. It was injured, and I had no example at hand for comparison. Has any one reported it from Canada, or from any place in New York north of Staten Island? D. S. KELLICOTT, Buffalo, N. Y.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., OCTOBER, 1884. No. 10

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from Page 179, Sept. No.)

Mr. Saunders said *Hyphantria textor* had this season been found in great abundance on all kinds of trees. *Van. progne* had been sent from one locality in West Ontario, where it was so common on currants that fears had been entertained for the crop. No great damage had been done, however.

Mr. Graef exhibited some species of Lepidoptera, rare, or typical of recently described forms.

On motion, the meeting adjourned to Monday, Sept. 8, at 2.30 p. m., same place.

Sept. 8th, 1884. Pursuant to adjournment, the Club met at 2.30 p. m., President Morris in the chair. The minutes of the previous meeting were read, corrected and adopted.

Prof. Martin exhibited some insects imbedded in copal, all representing types of post-tertiary forms, mostly small Hymenoptera and Diptera, but some Coleoptera, Lepidoptera and Hemiptera. The specimens were obtained by seekers of the resin of which copal varnish is made, not far from the sea coast, a little north and south of the equator. The same sort of gum is now found on growing trees, but soft, and not good for varnish, used only for the purposes of adulteration. The true gum in which these insects were found was obtained in districts where the trees had long been extinct, and was found only by digging. All the species were post-tertiary forms, and he had especially noted types of *Cleri.*

The specimens, which were very clear, were handed to the members for examination.

Dr. Horn said that the Coleoptera all represented existing generic types: 1 Carabid, allied to *Callida;* 2 Chrysomelids, 2 Clerids, *Clerus ocymatodera;* 2 Longicorns allied to *Clytus* and *Leptura*, and an Elaterid much like one of our species of *Cardiophorus.*

Mr. Smith said the Lepidoptera were all of very recent types; one specimen was almost surely a *Mamestra*. The Hemiptera were also very like species known to him, and at least one Dipteron represented a very common Muscid type.

Prof. Lintner gave some notes of observations made during the past year.

Orgyia leucostigma, else very common and destructive at Albany, was this season very rare, and did no damage. Usually they defoliated the elms and horse chestnuts, and sometimes when a heavy storm came on so many were destroyed that they became offensive. This rarity is explained by a severe frost which occurred in spring just as the larvæ were hatching.

An interesting note came from Prof. Cook, of Michigan, where thousands of a Noctuid larva created fears for crops. The larva was bred, and proved to be *Agrotis fennica*, usually considered rather a rare insect. So common were they that they were called the black army worm.

From Jamestown, N. Y., an Hemipterous insect, *Podisus cynica*, has been received, and it was there observed destroying the currant worm in numbers. Its variety, *P. bracteata* Fitch., was associated with it.

From the vicinity of Rochester *Lygus lineolaris* has been recorded as injurious to young peas, piercing and blotching them, a fact not previously noted.

At Geneva, N. Y., *Poecilocapsus lineatus* has seriously injured gooseberry plants, stinging the branches at tip so that they died off two or three inches downward.

In Coleoptera, the Clover-leaf Beetle has spread westward, and has nearly reached the western limits of the State. Some three years since it was recorded from Yates and adjoining counties, and since has spread rapidly; moreover a new habit has been acquired, *i. e.*, it now has attacked beans. The insect is *Phytonomus punctatus*, an imported species.

The Asparagus Beetle, *Crioceris asparagi*, has made its appearance at Geneva, N. Y Heretofore it has been confined pretty closely to the sea shore, and though known for many years on Long Island, it has never before manifested any tendency to spread.

From Sycamore, Oswego Co., an interesting attack of *Otiorhynchus ligneus* was reported; there a house which for four years had been closed, was opened and found swarming with these beetles; they were everywhere, and in many rooms nearly a quart was swept up. What did they feed on? There was nothing eatable in the house; they had been re-

corded as feeding on the roots of strawberries, but what they could find in the house puzzled him.

The Elm-leaf Beetle, *Galerucella xanthomelaena*, has been very destructive in Long Island and in West Chester, many of the noble elms being so entirely stripped that their death is expected. Nothing entirely new has presented itself during the year.

From Mexico had been received specimens of a seed, probably of a *Euphorbia*, known as the jumping seeds. The seeds apparently are formed in a pod, three in one inclosure. When placed on a hard surface they begin a series of the most erratic movements, tumbling from side to side, and sometimes making leaps of an inch or more. Inclosed in the seeds is a white, somewhat flattened larva, and the seed itself, a mere shell, is lined with reddish silk. Westwood has raised the larva to maturity and found an insect very closely allied to *Carpocapsa pomonella*, which he called *C. saltitans*. At about the same time Mr. Lucas, in France, also received the insect, and not knowing of Westwood's work, re-named the species. The entire life history of the species is not yet known ; it is supposed that the insect deposits its egg on the young seed, and the larva when very small makes its way into it. No trace of an opening was now visible. Westwood and Lucas report the insect as obtained in February, but only a few days ago a specimen was caught flying in the room. The curious thing is the close resemblance to our *C. pomonella*, which has no such habits. Referring to Mr. Smith's remarks on tuftings of the feet of Noctuidæ, *C. saltitans* is peculiar in having the tarsi hidden by long tufts of scales.

Mr. Dimmock says that *O. leucostigma* has not been abundant near Boston, and that the spring frosts affected the eastern rather than the western portions of the State.

Mr. Smith replied that on Cape Cod he had found the larvæ so abundant that they stripped the trees everywhere, and there had been frost enough to kill a large quantity of vegetation.

Dr. Horn said it is a remarkable fact that all of the Coleoptera mentioned by Prof. Lintner are imported species, and for the most part they have kept pretty close to the sea shore. It is interesting that they have commenced their journey toward the interior ; it was to be expected, however, that eventually they would travel along the lines of their food plant, as did the potato beetle from west to east. At Washington he had noticed the elm trees stripped of their leaves. Another species, *Crioceris*

12-punctata, has of late been taken by Mr. Lugger around Baltimore. It is rather curious that the neighborhood of Baltimore and Alexandria, with comparatively a very limited commerce, should still have yielded a proportionately very large number of imported species. Two species of *Blaps* have been introduced and first found near those cities, one *mortisaga*, and another not yet determined. Of *B. mortisaga* a friend said that a bushel could be taken from a single cellar in Alexandria. Another very curious matter is the very sudden spread of insects. When working over the Rhyncophora some years since with Dr. LeConte, every collector was applied to for material, and from Mr. Fuller was obtained a little species, marked Montana, which was named *Aramigcs Fulleri*, and was then the only known specimen. Suddenly, a year or two afterward, specimens were received for determination from all parts of the country, and everywhere complaint was made of injury caused by the species, especially in hot houses. How happened it that for ages the beetle was unknown, an inhabitant of some remote locality, and suddenly it should spread all over the States?

Prof. Lintner said he had known the species since 1876; that year it was abundant in green houses.

Mr. Dimmock had known the species for some years as very destructive to roses in hot houses.

Dr. Horn said he first obtained the beetle in 1874, or perhaps a little earlier.

Mr. Hulst, referring to Prof. Lintner's remarks on *O. leucostigma*, had noticed its comparative scarcity on Long Island. The elm beetle was common. Another pest not mentioned was a small insect apparently of the frog spittle nature on maple. Sometimes the trees were white with it, and many appeared dying off. A species of *Chrysops* was also common, and seems to have been destroying the pest.

Prof. Lintner had noticed the same insect; it is a Coccid, *Pulvinaria innumerabilis*.

Prof. Osborn said it is very abundant on maple. It can be subdued by cutting the infested branches before July. The young go first to the leaves. The female lives until spring, the male dies in the fall. No less than seven different species of insects prey upon this form.

Mr. Saunders said the insect had appeared in Canada and Michigan in large numbers, the trees being sometimes completely covered. On some trees the larvæ of *Chilocorus bivulnerus* were found feeding on them

in such numbers that they had caused alarm; persons finding them supposed that they were the parents of the pest.

Mr. Underwood inquired whether this insect was not also found generally on elm. Mr. Rathvon had published an article on the subject, and had referred to its feeding on elm as a rarity. It had been observed also on grape and *Ampelopsis*.

Mr. Saunders had not observed it on elm in Canada.

Dr. Horn made some observations on secondary sexual characters of Coleoptera. He had been interested in Mr. Smith's studies on the external anatomy of Lepidoptera, and especially in the remarks on secondary sexual characters. Somewhat similar antennal structures were sometimes found in Coleoptera, but their uses in this order seemed better known. In *Collops* was a structure closely resembling that of *Renia*. Here there was the same excavated curved joint, at the base of which was an articulated slender spine-like appendage, and the upper part of the antennæ was capable of being folded backward. The use of this was in copulation; the ♀ antennæ were grasped in this curve, the articulated spine closed the curve by being directed forward, while the anterior part of the antennæ was folded backward, thus tightly holding the ♀ antennæ. The form in *Meloe* is similar to that of *Herminia*, and without the articulate spine still serves the same purpose. In *Sphalera* and *Tomoxia* there is a double jointed appendix to the last joint of the maxillary palpi which probably served the same purpose. These structures are explainable. Others are more obscure and not yet explained. For instance, *Lebia* has a notch on the inside, near the end of the middle tibia in the ♂. A species of *Aphodius* has a very curiously hooked first tarsal joint to the hind leg. Another species has a peculiar club-shaped appendage to the inner side of the fore tibiæ. What use these served was not yet satisfactorily ascertained.

Mr. Cresson said that except in the parasitic forms, there were no such characters in the Hymenoptera, and that group he had not studied.

Mr. Osborn stated that very interesting characters occurred in the Mallophagidæ, and especially one in *Lipeuris*, which much resembled that of *Tomoxia*.

Mr. Smith moved the appointment of a committee of three to arrange a programme and secure papers for the next meeting; seconded and carried. The committee appointed consisted of Mr. J. B. Smith, chairman;

and Messrs. Herbert Osborn and B. Pickman Mann. On motion the Club then adjourned, to meet again under the rules at the next meeting of the A. A. A. S.

(The above has been compiled chiefly from the excellent report of the Secretary, Mr. John B. Smith.—Ed. C. E.)

COLEOPTERA IN SEPTEMBER ON BRIGANTINE BEACH, N. J., ON THE ATLANTIC COAST.

BY JOHN HAMILTON, ALLEGHENY, PA.

Coleopterists accustomed to collect on the sea shore may find little that is new to them in this article; but to those from the interior, making only occasional short visits, it may be useful in directing attention to some of the less common insects, and to some not likely to be found by one unacquainted with their habits. Brigantine Beach is somewhat insular, being six or seven miles off from the main land, yet none of the Coleoptera mentioned are peculiar to it, and, being mostly maritime species, probably occur in suitable situations all along the coast from New York southward indefinitely.

This beach is nothing more than a succession of sandhills elevated from five to ten feet above the line of high tide, two or three hundred yards wide, fronting on the ocean and extending from inlet to inlet about six miles. Some of these hills are thinly overgrown with coarse grasses; and others with thickets of *Myrica cerifera* (Bay berry), interspersed with *Rosa lucida* and clumps of *Baccharis halimifolia*, so conspicuous in this month by its abundant, very long and white pappus. Back of these hills to the Bay are the salt meadows, from five to seven hundred yards in width; they are overflowed by the high tides in spring and autumn, though several inches above the ordinary ones of winter and summer; they are always damp, and support a growth of coarse grass, sedge, etc. At first sight this does not appear to be a very promising field for the Coleopterist, and yet the catalogue contains nearly three hundred species.

Panagæus crucigerus Say annually rewards the careful searcher with a few specimens, occurring mostly on the little circular elevations on the meadows under pieces of wood and the debris left by the high tides.

Philhydrus reflexipennis Zimm. is found in the shallow fresh water pools that are formed at the base of the sandhills, together with *Hydro-*

philus glaber, while *P. ochraceus* is abundant on the meadows under boards and pieces of wood.

Emplenota maritima Casey. This minute insect has only recently received a name, generic and specific. It is found in moderate abundance on the coast under the debris cast up by the waves and left by some of the higher tides along the high-water line, after it has remained undisturbed for three or four days. It is readily recognized by its great resemblance to a small Aleochara; length, .12 to .16 inch; head deflexed; sides of abdomen strongly margined; color piceous black with the anterior border of the abdominal segments pale. It is usually found in company with *Cafius bistriatus* and *Phaleria testacea*, without vigilance it will be overlooked. (See Number I., Contributions to the Descriptive and Systematic Coleopterology of North America, by Thos. L. Casey, Lieut. of Eng'rs, U. S. A.)

Quedius brunnipennis Mann. is sparingly found under the debris left by the high tides along the margins of the meadows. *Staphylinus prælongus* Mann. occurs in the same situations much more abundantly. *S. vulpinus*, *S. tomentosus* and *Ocypus ater* are found with it rarely, and more properly belong to the main land.

Cafius bistriatus Er. is met with as stated under *E. maritima*, and is rather abundant. The debris should be shaken over the white sand, on which the insects may readily be seen as they fall. It is easily known by its brown color and bistriate thorax.

Bledius mandibularis Lec. is exceedingly abundant in the meadows on bare sandy places not often covered by the tide, but kept constantly damp by capillary attraction. One, as in the case of the writer, might pass over them for years unconscious of their presence till discovered by accident. They live in galleries at a depth of from six to ten inches beneath the surface, the entrance to which is surrounded by castings similar to those made by earth worms. The upper portion of these openings is used by two or three species of small crustaceans for a retreat, and when the novice scoops over the wet sand, finding these and considering them the excavators, he goes no further, and the real architect several inches deeper escapes detection. The species is one of the finest of the genus.

Bledius cordatus Say, though existing in countless multitudes, is not often found, being small, and mostly inhabiting the grassy parts of the meadows. They occasionally fly at night in swarms, but whether this

occurrence is periodically habitual, or accidental from some local cause, is not known. I obtained nearly an ounce bottle full of them on the night of Sept. 28th, 1883, and could easily have procured half a pint. The evening was warm and sultry, and exceptionally calm. When the central chandelier in the parlor of the hotel was lit, my attention was directed to a fall of small insects from the lights to a marble-topped table beneath. I saw they were brachelytra, and in a couple of hours (the duration of the flight) had taken from this table the quantity stated. They invaded all the lower parts of the hotel where there were lights, occasioning no small annoyance. They proved to be of this species. No one connected with the hotel had ever noticed them before ; none occurred the next, or subsequent evenings. This year I left on the 26th without having observed a single one, though they were doubtlessly present in millions.

Rhypobius marinus Lec. is met with abundantly on the elevated places on the meadows under debris that lies on dryish sand. It is interesting chiefly on account of being so minute. The only other species of the genus known to me is found here on leaves, generally hickory and walnut ; it is much larger and as yet undescribed. With *marinus* is found in great abundance *Anthicus formicarius* and *Bembidium constrictum.*

Anisosticta seriata Mels. is usually taken about the remains of dead animals, but not plentifully. Whether it is carnivorous, or only resorts to such places for shelter, is not known, but I never found it elsewhere. The ornamentation of the elytra is a little variable. Normally there are three large common sutural spots connected by a line, and three marginal spots slightly connected on the margin, black ; these spots, however, may all be isolated ; or the marginal ones become confluent, and also unite with the posterior sutural spot which usually extends to the margins of the elytra. The amplification of Melsheimer's description by Mr. Crotch in the Trans. Am. Ent. Soc., vol. 4, p. 369, is quite misleading.

Dermestes Frischii Kugel occurs on the sandhills among the refuse of fish. This year only a few specimens were obtained on account of the food supply having been minimized.

Hister arcuatus Say. Specimens of this beautiful species are occasionally taken on the sand, but I could never find its habitation.

Monotoma producta Lec. occurs in the same situations as *R. marinus*, where it is difficult to see, as it feigns death, and then resembles fine particles of the debris. A good way to obtain it is to examine the underside

of chips and pieces of wood, to which it often clings in considerable numbers, and where also will be found *Mantura Floridana.*

Aphodius phalerioides Horn is rare, for during eight years only three specimens were found, and the circumstances of their occurrence were not noticed, as they were in the collecting bottle with the superabundant *Phaleria testacea*, from which they can only be separated by careful examination.

Ataenius. An undescribed species is found on the meadows under moist decaying debris. This species is about the size of *stercorator*, and one of the finest of the genus. It may be known by its fine, narrow elytral striæ, with small, close tranverse punctures; broad, flattish intervals, and deep piceous black color.

Trox scabrosus Beauv. is rare, being met with in dry sand under desiccated human excrement, or under boards in its vicinity; and here it may be remarked that no Coleopterous insect in any stage seems, on this island, to inhabit the ejectamenta of herbivorous animals. *T. asper* and *T. suberosus* may be found sparingly about the remains of dead animals, but such are rare.

Ligyrus gibbosus DeGeer comes at night to light in vast numbers. In the office of the hotel in less than one hour, one evening, over a hundred specimens were taken. It seems to be distributed in the United States from the Atlantic to the Pacific.

Euphoria areata Fab. is likewise a widely distributed species in the warmer arenaceous districts, but not recorded as occurring west of Texas. What its habits are in other places and at other times is unknown to me, but my experience with it is this: Sept. 9th, 1877, about ten o'clock in the forenoon, five specimens were taken flying about a small sand hill crowned with wild rose bushes; next day about 100 were taken from ten to twelve, and the succeeding day five or six at the same hours, but none on any subsequent day. The next year I reached there on the 15th, but saw none that season. The third year I came on the 5th, but none appeared till the 10th, when about thirty were taken, and on the next twenty, but none thereafter. From that year till the present I was never there previous to the 12th of September, and no specimens occurred. The present year I came on the 9th, and took two specimens at the usual hour on the 11th, but none thereafter. Back of this sand hill, in 1877, was about half an acre of cultivated ground, which was abandoned three years ago. I infer from all this that the insects I met with were bred in

that garden ; that they completed their transformations annually about the same day, and emerging from the earth about the same hour immediately resorted to the nearest sand hill to find a place suitable for social hybernation.

Galeruca maritima Lec. is more abundant on the meadows earlier in the season, though a number may still be found under any stick or board that affords them shelter. Their color varies from pale to brownish black.

Epitragus arundinis Lec. is found in warm days on the sand, or on the board walks, but not plentifully.

Anthicus pallens Lec. is rarely found. It occurs on the sand hills in the loose sand under or near human excrement that has dried up, or been partly consumed by *Saprinus Pennsylvanicus*, *Sphæroides fraternus*, &c. By carefully scooping over the sand to the depth of five or six inches a specimen may rarely be taken, though it requires patience and close watching, as they are few and far between, and white like the sand.

Anthicus confusus Lec. is met with frequently in cultivated places under decaying vines and weeds. Three or four other species of this genus are likewise found here, but are not determined.

Sphenophorus retusus Gyll. frequents dry sandy mounds that support a sparse growth of coarse grass, where it may be found sparingly on very warm sunny days. It is easily known by the smooth rhomboidal figure on the thorax, and the elytra no longer than the head and thorax together.

S. costipennis and *S. pertinax* are sometimes found in dry places under sods, and *S. placidus* occurs in large numbers under logs that have drifted upon the meadows and become embedded in the wet soil.

Except incidentally, is omitted all mention of such maritime species as are abundant, and the many that are likewise found inland, besides a large number of no particular interest at present. Species often find their way there accidentally, being blown by the wind and otherwise transported from the main land, or cast up by the waves. At this season among the former is *Cicindela modesta* Say.; among the latter, *Calosoma scrutator*, *Purpuricenus humeralis* and *Pachylobius picivorus*.

The *Carabidæ* and *Staphylinidæ* are in general well represented, while the *Elateridæ*, *Buprestidæ*, *Lampyridæ* and *Cerambycidæ* seem to be entirely absent as regular inhabitants.

THE MELSHEIMER FAMILY AND THE MELSHEIMER COLLECTION.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The Melsheimers have been considered by Th. Say to be the fathers of Entomology in the U. States. Nevertheless very little is known about them, and that little is not perfectly accurate. In fact, concerning the older Melsheimer there exists only a note in A. W. Knoch's "Neue Beitraege zur Insectenkunde," 1801, p. 18, and concerning his second son only the necrology by the late Dr. John L. LeConte in the Proc. Acad. Nat. Sci. Phil., 1873, p. 257, reprinted in the CAN. ENT., vol. vi., 1874, p. 39.

Through the courtesy of Dr. Geo. H. Horn, the manuscript diary of Dr. Carl Zimmerman is before me, which contains the following statements :—

"From York, Pa., I walked 18 miles to the S. W. to Hanover, where I arrived Jan. 7, 1834. Introduced to a Mr. Lange, the owner of the only press in the town, and editor of the Hanover *Gazette*, I was informed that the older Melsheimer died 20 years ago. Mr. Lange had been well acquainted with him, and the widow and several children are still living in the town. The following I copied out from the obituary in the Hanover *Gazette* at the time of Melsheimer's death :—

"'Friedrich Valentin Melsheimer, minister of the Evangelic-Lutheran Church in Hanover, died June 30, 1814, in consequence of a lung disease of 30 years duration, 64 years, 10 months and 7 days old. He was born Sept. 25, 1749, at Negenborn, in the dukedom of Brunswick. His father, Joachim Sebastian Melsheimer, was superintendent of forestry to the duke. F. V. Melsheimer was sent in 1756 to school in Holzminden ; in 1769 he went to the university in Helmstædt. He received, 1776, the appointment as chaplain to a regiment, which he accompanied to America, and arrived July 1st in Quebec. In 1779 he came to Bethlehem, Pa., and married, June 3, Mary Agnes Man, by whom he had 11 children. From August 19, 1789, he was minister in Hanover, Pa.'"

Dr. Zimmermann called on Mrs. Melsheimer, and was told by her and her daughter that after his death his eldest son, Johann Friedrich Melsheimer, succeeded his father as minister, whose love for natural history he had inherited, together with his collection and library. This J. F. Melsheimer is the entomologist quoted so often by Th. Say. The year of

his death is not known to me; at least it was some time before 1834 and after 1824, where he is quoted by Th. Say in his Amer. Entomology by *Anthicus bicolor*. The father, F. V. Melsheimer, was in correspondence with the well known German entomologist, A. W. Knoch, in Brunswick, who states in the volume before mentioned that up to 1801 he had received from him over 700 American insects. He gives still very valuable descriptions of 23 species.

F. V. Melsheimer published, besides some papers on religious matters, the well known catalogue, "A Catalogue of Insects of Pennsylvania," by Fred. Val. Melsheimer, Minister of the Gospel, Hanover, York County; printed for the author by W. D. Lepper, 1806, Part I., small 8vo., pp. 60.

The catalogue (I am indebted for a copy to my friend, Ph. R. Uhler, of Baltimore), is now very rare, and contains the names of 1,363 species of beetles, among them 460 named by Knoch. It seems that at this time Melsheimer had not received Knoch's book, published 1801, as his names do not coincide with those described by Knoch. As the dedication copy of Knoch's book to Melsheimer is in the library of the Museum in Cambridge, it came probably to Melsheimer after 1806. This catalogue contains the first list of American beetles, but without descriptions, and has therefore only an historical value. Of the 1,363 species, only 205 are now surely known, and only 134 are quoted in Dr. F. E. Melsheimer's catalogue.

After the death of the eldest son, the second, Ernst Friedrich Melsheimer, inherited the collection and the library. He was a country physician and lived near Dover, 14 miles north of Hanover. Zimmermann visited him the next day, and his diary contains the following statement:—

"The house, rudely put together with boards, painted red, stood all alone in the middle of a forest, and looked more like a hut. His wife was at the spinning wheel. The reception was indeed very cordial, and when he heard that his father's book was well known and mentioned in German, English and French works, which he never had dreamt of, he became animated and talked with great interest on entomological matters and books.."

Zimmermann wondered how he was able, in his isolated position, to keep up such a lively interest in natural science, to collect so industriously, and to study his small library, in which the magazines of Illiger and Germar were the most prominent and most valued. Though he

could not claim to equal the stars among the entomologists in Europe, he filled very well the place of a first rate entomologist in America. The next day was spent with the collection, which contained chiefly Coleoptera and Lepidoptera, and only little of the other orders, apparently on account of the want of books about them. The collection was kept in good order, and all labels in his father's handwriting were on the pin of the same specimen to which they were originally attached.

"Melsheimer," says Zimmermann, "lives with his family on a very plain but good fare, as is generally the case in America. Many little and cheap comforts were wanting, but their absence was not felt. Indeed there was no drinking glass in the house; cans or dippers served for the purpose. The cordial hospitality made one forget the lack of comfort."

Twice more, July 12, 1839, Zimmermann visited Melsheimer in company with Pastor D. Ziegler, and August 20, 1839, with Rev. Morris, of Baltimore.

Already in 1832, Dr. Melsheimer had the plan, as Zimmermann states in 1834, to publish, with Th. Say, a new catalogue of the Coleoptera of N. America, which was prevented by Th. Say's premature death in 1835. Dr. LeConte says in the obituary that his father (the name E. F. Melsheimer is an error for F. V. Melsheimer) has been an active collaborator with Th. Say. This could not have been, as the father died 1814, and Th. Say began to work in 1817. This active collaborator was the eldest son, J. F. Melsheimer, quoted often by Th. Say, and later the second son, Dr. Melsheimer. The work advanced slowly. In a letter to Th. W. Harris, Nov. 24, 1842, Dr. Melsheimer states that "a few literary gentlemen in Pennsylvania and Maryland have entered into an association for the advancement of entomology in our country (the Entomological Society of Pennsylvania). Their first object in view is the publication of a catalogue of the known Coleoptera of the U. S. The members of the Club have prevailed on me to compile the work and have it ready for the press against the ensuing spring!!" Dr. Melsheimer was elected President of this Club, of which, as far as I know, Rev. John G. Morris, of Baltimore, is now the only survivor. Dr. Melsheimer complains to Th. W. Harris that the work, though only a compilation, is very difficult, and advances slowly. It was published only ten years later, as it had been determined that the unknown species should be described. In the meantime Rev. David Ziegler, in York, Pa., seems to have been a very active collaborator. He has published in Proc. Ac. N. Sc. Phil., 1844, v. ii., p.

43-47, p. 266-272, 36 new species. Nothing more is known about him, but he must have been in very kind relations with Dr. Melsheimer, to judge from the contents of his collection, which is now in the Museum in Cambridge. It seems that they divided between them every lot of exotic species received by each, and for American species it is nearly the same. Dr. Melsheimer also published in the Proc. Ac. N. Sc. Phil., 1844-47, vol. ii. and iii., 431 species (vol. iii., p. 181, it is erroneously stated, 600) of Coleoptera hitherto not described. Only 172 of them have been retained in Crotch's Catalogue. Finally the Catalogue of the described Coleoptera of the U. S., by Fried. Ernst Melsheimer, M. D., revised by S. S. Haldeman and J. L. LeConte, Washington, 1853, 8vo., pp. 174, was published by the Smithsonian Institute. The revision had necessitated a long delay after the delivery of the manuscript. Nobody can say now how much belongs to the revisers, but it is to be presumed that their task was not a small one. "It was the first work," says LeConte, "of bibliographical importance in the modern history of that branch of science, and gave a powerful impetus to its development in the U. S., and has greatly diminished the labor of those who have continued the study of that department."

Dr. Melsheimer was then 71 years old, and has probably later done no more entomological work, except that he arranged his collection in accordance with his new catalogue. When 82 years old he sold the collection to Prof. L. Agassiz, and died March 10, 1873, in Davidsburg, York Co., Pa., aged nearly 91 years. His birthday is not known to me; it must have been in 1782.

I cannot refrain from giving here again Dr. LeConte's kind parting words: "Living an isolated life on his farm, remote from usual lines of travel, dependent almost entirely on letters for the sympathy and counsel of his fellow students, separated from libraries containing the results of modern research, and therefore dependent on the traditional knowledge received from Europe, which constituted in fact most of the intellectual capital of the founders of natural history in the United States, Dr. Melsheimer must be considered as a very remarkable instance of one who, with very limited opportunities, has worked honestly, to the extent of his abilities, to develop the powers of usefulness which were given him. Modest, unpretending, affectionate to his family, devoted to his friends, industrious to the limit of human usefulness, his death at such an advanced age can only leave, with those who have enjoyed his acquaintance, a satis-

faction that they have known so good a representative of the purer qualities of humanity."

THE MELSHEIMER COLLECTION.

As stated before, Dr. Melsheimer, when 82 years old, sold in 1864 his collection to Prof. L. Agassiz, who also bought at the same time Rev. Ziegler's collection. Dr. Melsheimer had preserved, as LeConte states, the only authentic types of many of Mr. Say's species for later investigators. Prof. L. Agassiz has told me that he had invited LeConte to take over into his collection all types and species out of both collections which he needed for his studies; these have been returned to the Museum now with LeConte's collection. In his letter which promised the donation of his collection to the Museum, (Ann. Rep. of the Museum for 1875, p. 35) LeConte says: "My collection contains specimens carefully compared with those described by Say, Harris, Melsheimer, Haldeman and Ziegler, and *all the unique types* of the three last named authors."

The Melsheimer collection filled 41 home-made wooden boxes, painted outside with light gray color. They are 10½ by 14 inches, and 2 inches high. Inside lined with white glazed paper; the bottom of the apparently older ones of plain wood, the newer ones lined with Helianthus pith. The cover is a board with the margins around planed off half an inch, to trim into the box. The beetles were arranged on transversal lines parallel to the smaller side of the box. On those lines were pasted the printed labels of the genera and species cut off from the catalogue published in 1853. The labels of the exotic species were written on colored paper and also pasted in. By this arrangement, after the publication of his catalogue, he had removed nearly all labels from the pins, also those of his father. Only exceptionally some labels of Say and some foreign authors were retained. Indeed the old beetles of his father are to be recognized by short common pins, and the beetles of Dr. Melsheimer by German pins from Carlsbad, a little shorter than those now used. I am often able to recognize in LeConte's collection the specimens taken out of the Melsheimer collection.

The contents of the collection are taken from the receiving book of the Entomological Department of the Museum, recorded with scrupulous accuracy by Mr. Ph. R. Uhler (Ann. Report of the Museum for 1864, p. 35):—

"The collection was received Sept. 1, 1864; bought for $150. It

contained, netto, 4,941 species, with 14,474 specimens. Coleoptera, 4,674 species, with 14,075 specimens, of which belong to U. S., 2,200 species, with 10,272 specimens; from Europe, 1,894 species; Brazil, 422; Mexico, 8; West Indies, 9; Siberia, 4; China, 74; Java, 8; Africa, 39; Australia, 14. The other insects were, Hymenoptera, 148 species; Hemip- 28; European Diptera, 90; Lepidoptera, none."

The contents of the Ziegler collection were, after the same Report, netto, 5,302 species, with 11,837 specimens. U. S. Coleoptera, 1,794 species, with 6,262 specimens. From Europe, 1,729 species; Brazil, 378; Mexico, 34; West Indies, 40; Siberia, 21; China, 55; Java, 12; Africa, 110; Australia, 14, besides Lepidoptera, Orthoptera, Neuroptera, Hymenoptera, Diptera. The Ziegler collection filled a cabinet with 45 boxes in three rows. The boxes are a little smaller than the Melsheimer ones, the bottom of plain wood, the cover with a pane of glass. Every species had a square written label on the pin, with the name and the locality.

When I arrived here in 1867, both collections were in their original state. As the boxes were far from being safe, they needed a very careful supervision, being more easily entered by pests than all other ones. How much had been destroyed before I arrived, I do not know; but it could not have been more than a small number of specimens, to judge from the gaps in the series of specimens. LeConte has not retained in his collection the somewhat cumbersome labels of Ziegler, nor labeled the Melsheimer specimens.

In 1872, after LeConte had decided to present his collection to the Museum, we had together a serious consultation if it was of any importance to science that both collections should be retained for ever in their original shape. LeConte was decidedly of opinion that it would not be of any scientific value, the more so as all specimens of importance had been transferred into his collection. As the original boxes were unsafe, and as by a transfer of both collections into new safe boxes, the originality of the collections would be lost to a considerable extent, we agreed that the insects would be better incorporated into the collection of U. S. Coleoptera of the Museum. This decision was approved by Prof. L. Agassiz, as in this way a permanent centre of infection and danger for the other collections of the Entomological Department would be abolished. I have myself put on every pin a small printed label—Melsheimer or Ziegler—to record the former proprietor. Nevertheless, some time later,

when I had no control of the Coleoptera, a somewhat cranky assistant threw away labels by the bushel, without any consideration whether they were types or in the handwriting of the most eminent entomologists, and replaced the labels by numbers referring to a carelessly written catalogue. A number of families of the Melsheimer and Ziegler collections shared the fate of this destruction.

NOTES ON MALLOPHAGA AND PEDICULIDÆ.

BY HERBERT OSBORN, AMES, IOWA.

[Read before the Entomological Club of the A. A. A. S.]

Identical or very similar species of these parasites occur on the closely related birds and mammals of Europe and America, as is shown by the following list of species collected at Ames :—

DOCOPHORUS.

D. platystomus N. On *Buteo swainsonii*, differs slightly from Denny's description and figure. In Europe occurs on *Buteo vulgaris.*

D. cursor N. On *Otus vulgaris* var. *Wilsonii*, differs from Denny's description in having lateral fasciæ on seven segments, the eighth being entirely dark, the ninth white ; foveolæ arranged differently on the fasciæ. But these points agree well with Piaget's figures, so there may be a discrepancy in Denny's work. In Europe occurs on *Strix (Otus) brachyotus*, according to Piaget, and *vulgaris* and *brachyotus*, according to Denny.

D. testudinarius D. On *Numenius longirostris*, agrees quite perfectly with Denny's description of specimens from *Numenius arquatus*, also with Piaget's figure.

D. cygni D. On *Cygnus buccinator* (?) Identical with descriptions of European specimens from *Cygnus musicus*, according to Piaget, and *C. Bewickii*, according to Denny.

Specimens belonging to this genus were also taken from Shrike, Hairy Woodpecker, Tern, Crow, Blackbird, Finch, House Martin and Coot, but are as yet undetermined.

NIRMUS.

N. fuscus N. On *Buteo swainsonii.* Differs slightly from Denny's description and figures of specimens from *Buteo vulgaris.*

N. brachythorax G. On *Ampelis garrula.* Agrees very closely with descriptions and figures of specimens from the same bird in Europe.

N. candidus N. On *Colaptes auratus;* also same species, probably, from *Picus villosus.* Differs from descriptions of specimens from *Picus canus* and *P. viridis* of Europe in some details, and further material may perhaps establish it as a variety.

Also undetermined *Nirmi*, from Crow, Meadowlark, Pelican, Yellow-headed Blackbird, Duck and Avocet.

ONCOPHORUS.

O. minuta N. On *Fulica americana.* Occurs in Europe on *Gallinula actinopus, orientalis* and *haematopus*, according to Piaget, and probably equals Denny's *N. fulicæ* from the *Fulica atra.*

LIPEURUS.

L. baculus, N. On domestic pigeons. No apparent difference from European specimens.

L. squalidus, N. On *Anas boschas.* Apparently here, as in Europe, common to many species of ducks. Also undetermined *Lipeuri* from Crane, Avocet, Bittern and Snipe.

ORNITHOBIUS.

O. bucephalus G. On *Cygnus buccinator.* Agrees closely with descriptions of specimens from *C. musicus.*

TRICHODECTES.

T. retusus N. On *Putorius ermineus.* Occurs in Europe on *Mustela vulgaris.*

T. scalaris N. Common to cattle the world over.

T. parumpilosus. Common to horses.

Also specimens in this genus from the Pocket Gopher, *Geomys bursarius*, apparently undescribed.

MENOPON.

M. pallidum N. Common to domestic fowls.

Also several undetermined species.

COLPOCEPHALUM.

C. flavescens N. On *Nauclerus furcatus.* In Europe said to occur on various Raptores.

Also undetermined *Colpocephali* from *Scops asio*, *Junco hyemalis*, *Bubo virginianus*, *Melanerpes erythrocephalus*, and a duck.

NITZSCHIA.

N. pulicare N. On *Chætura pelasgia.* Abundant on every bird of this species that I have examined. The eggs were always found attached to the feathers on the back of the head, and on no other part of the body. Apparently no difference between these and those on *Cypselus apus* in Europe.

TRINOTON.

T. luridum. On *Anas boschas.* Occurs in Europe on many species of ducks.

PEDICULIDÆ.

Pediculus capitis and *vestimenti* and *Phthirius inguinalis* naturally present no variations.

HAEMATOPINUS.

H. piliferus. On dog. Has not been found common.

H. eurysternus. On cattle. Common, and without any noticeable variation. A related species, though quite different, has also been secured from cattle, but as yet not harmonized with any European species.

H. acanthopus. On *Arvicola.* Agrees closely with European.

Specimens of undetermined *Haematopini* presenting very marked characters, have been taken from five different species of Rodentia, the specimens from one of these *(Geomys bursarius)* differing so greatly as to necessitate a revision of the generic characters, or else the forming of a new genus.

The author desires to make a careful study of these groups, and would be very glad to obtain specimens.

ENTOMOLOGICAL NOTES.

BY DR. P. R. HOY, RACINE, WIS.

Racine, Wis., is situated on the west shore of Lake Michigan, at the southern extremity of the heavily timbered district, where the great prairies approach near the lake from the west. Latitude, 42° 46″ N.; longitude, 87° 48″ W.

This is rather a remarkable point for entomological, as well as ornithological collecting. Many insects usually found much further south, east of the great lakes. are met with here not unfrequently. A few such I here indicate :—

Nathalis iole *Bd.* Not abundant.
Callidryas eubule *L.* Common.
" philea *L.* 1883.
Terias nicippe *Cram.* Four specimens taken.
" mexicana *Bd.* One, 1883.
Junonia lavinia *Cram.* Common.
Argus labrusca *Hub.* Occasionally.
Dilophonota ello *Linn.* Not common.
Thysania zenobia *Cram.* Four specimens taken here.

CORRESPONDENCE.

Dear Sir : Prof. Kellicott's inquiry in Sept. number of the ENTOMOLOGIST as to whether *Thyridopteryx ephemeræformis* Haw. has been reported from Canada, leads me to make some explanations. Last Feb'y I visited Mr. Kellicott, taking a box of moths for identification. Among them was a pretty little moth with clear wings. The specimen was somewhat abraded. Mr. Kellicott pronounced it, provisionally, the male of the basket worm above named. On June 28th I captured another male specimen, and the next day I found a pair of the same insect copulating on a leaf of basswood. This last discovery precludes the idea of its being the basket worm of Haworth, for in my specimens both sexes are winged; the female is thickly clothed and expands one inch; the male has transparent wings and expands ¾ inch; whereas in the true basket worm the female is wingless, cylindrical, and does not leave her case.

Packard says (Guide to Study of Insects, p. 289) :

" *Phobetrum* has narrow wings; the male is very unlike the female, which has been raised by Mr. Trouvelot, and was *confounded by us* with *Thyridopteryx ephemeræformis* of Haworth. The wings of the male are partly transparent."

I have no doubt, therefore, that the insect in question is *Phobetrum pithecium* A. & S.

A. H. KILMAN, Ridgeway, Ont.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., NOVEMBER, 1884. No. 11

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in London, at the Society's Rooms, Victoria Hall, on Wednesday, October 15th, 1884, at 7.30 o'clock, p. m.

The President, Mr. William Saunders, of London, Ont., in the chair.

Present: Mr. James Fletcher, Ottawa; Rev. Thos. W. Fyles, Quebec; Mr. J. Alston Moffat, Hamilton; Mr. John M. Denton, London; Mr. Wm. H. Harrington, Ottawa; Dr. Burgess, Mr. A. Puddicombe, Mr. H. B. Bock, Dr. Wolverton, Mr. L. B. Reed, and Mr. Chas. Chapman, of London; Mr. W. A. Macdonald, of the *Farmer's Advocate*, London, and the Sec.-Treas., Mr. E. Baynes Reed.

The minutes of the previous meeting were confirmed, the reading being dispensed with, as printed copies were in the hands of the members.

The President welcomed the members present, and expressed the regret they felt at the absence of some of those who in past years had attended the meetings, but were this year unavoidably absent, referring especially to Rev. C. J. S. Bethune, of Port Hope, and Mr. G. J. Bowles, of Montreal.

The Secretary presented the Report of the Council, embodying many of the results of the work of the Society for the past year, which will be published in the Annual Report.

The financial report of the Secretary-Treasurer was next read, showing a satisfactory condition of the funds. A report of the Librarian was also submitted, in which the additions to the library were enumerated, and a list given of the periodicals received in exchange for the CANADIAN ENTOMOLOGIST.

The report of the Montreal Branch of the Society was then presented, in which the work done by that energetic organization was referred to, presenting a gratifying exhibit highly creditable to the members comprising that branch.

Mr. Fletcher presented his report, read at the meeting of the Royal Society, as follows :—

REPORT OF THE DELEGATE OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

It affords me much pleasure, as delegate from one of the societies honored with an invitation to send a representative to the meetings of the Royal Society of Canada, to report that during the past year the work of the Entomological Society of Ontario has been vigorously prosecuted, on the same plan as that heretofore followed, with satisfactory and evident results. The monthly organ of the Society, the CANADIAN ENTOMOLOGIST, has been regularly issued, its pages having been entirely filled with original contributions from members of the Society on scientific and practical Entomology. The volume which closed with the year 1883, No. XV., consisted of 246 pages, and contained a number of papers on descriptive Entomology, embracing descriptions of no less than 4 new genera and 67 species of insects new to science ; also papers on practical Entomology, including life-histories of species, some of which have been minutely described in all their stages, and among them many injurious to agriculture.

With a view to popularize the science of Entomology, and to encourage beginners in the study, a special series of illustrated articles has been published, which we hope will have the effect of increasing the number of observers in this important branch of biology. To further this end, and to systematize the descrtptive work being done in such a manner as to secure uniformity in this department of research, the Council have prepared forms containing instructions for describing insects in their different stages.

There has also appeared during the year in the CANADIAN ENTOMOLOGIST much valuable information in reference to the geographical distribution of North American insects.

For the benefit of those interested in agriculture and horticulture, the Annual Report, which is always devoted to this practical aspect of the study, has recently been published, covering 83 pages, and embracing the Report of the Council, the Treasurer's Statement, the President's Inaugural Address, in which a review is given not only of the work of the Society during the year, but also of most of the important events of interest to

entomologists in North America, as well as popular articles giving descriptions of and remedies for such insect foes as may have been found particularly injurious to our forest trees and field crops.

In addition to this, a circular is being now prepared for circulation among the farmers and agriculturists of the Province, requesting them to report as promptly as possible on any insects which they may find injuring their crops, with a view to the suggestion of appropriate remedies.

The membership of the Society still increases and now stands at about 400, and we have on our roll members who are working for us in every province in the Dominion, as well as many of the leading entomologists in the United States. We have, however, to deplore, with the whole scientific world, the loss by death during the past year of some of our most active members. Of these special mention may be made of Prof. Croft, the founder of our Society, and Dr. J. L. LeConte, the celebrated Coleopterist.

The large collections of the Society have been further added to and the library considerably augmented, their usefulness for purposes of reference and study thus being much increased.

At the request of the Dominion Government, the Society undertook the preparation of a collection of specimens designed to illustrate insects injurious and beneficial to fish, to be exhibited in the International Fisheries Exhibition held last year in England. This collection, consisting of 40 cases, was prepared and sent forward to London, where it formed a most useful and attractive feature of the Canadian exhibit, and its merits were recognized by the award of a silver medal.

The Council of the Entomological Society of Ontario are glad to learn that the suggestions contained in their report to your honorable Society last year, with regard to increased facilities for the transmission of natural history specimens by mail, are, in response to a petition from the naturalists and students of science in Canada, receiving favorable consideration from the Hon. the Postmaster General, and they trust that the Royal Society of Canada will continue to use its influence in this direction on behalf of the students of natural history.

JAMES FLETCHER,, Delegate.

The President then delivered his annual address, as follows :—

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Gentlemen : The working entomologist, ever on the watch and ready to note the many items of interest in connection with insect life, will seldom pass a season without finding many facts worthy of record, which if not of general interest, are at least of local importance. While the year 1884 has not been marked by any unusual invasion of destructive insects, affecting our country as a whole and exciting general comment, yet many localities have suffered, either from the unusual development of familiar forms of insect life, or from the introduction of new pests.

Early in the year some excitement was caused in the Ottawa district by the appearance of a very destructive caterpillar in great numbers in the clover fields, which rapidly devoured the foliage. This was at first supposed to be an invasion of the veritable army worm, but on inspection it proved to be a very different insect. On the 23rd of May I had the opportunity of examining some of the affected fields in company with our Vice-President and Mr. W. H. Harrington. The caterpillars were exceedingly numerous, and much of the clover had been seriously injured by them. They were a species of cut-worm, the progeny of a moth known as *Agrotis fennica.*

This larva measured from 1¼ to 1½ inches in length, had a dark yellowish brown head with a black stripe down the front, and a black body with two yellow stripes on each side, the upper one composed of streaks and dots of yellow, the lower, which was near the under surface, formed of two crinkled yellow lines which approached each other on the anterior segments and diverged posteriorly. On the upper part of the second segment was a black horny shield; the breathing holes on the sides were also surrounded with black.

The underside was brownish black, the feet and the fleshy pro-legs pale brown.

At the time of this visit the caterpillars were nearly full grown, and it was observed that many of them were affected by a singular disease of a fungoid character which was destroying them very rapidly, the diseased insects after death remaining extended on the leaves of clover or blades of grass in a natural position, but somewhat discolored. On handling them the skin was found to be quite tender and the body filled with a thin, dark-colored fluid, the result of the decomposition of the tissues. This

disease spread very rapidly, and was no doubt contagious. I collected some fifty or sixty specimens, all apparently in a healthy condition, for the purpose of rearing them. These were placed in two separate boxes with a liberal supply of food. Within twenty-four hours a large number of them died, all apparently from this disease; they were frequently examined, the diseased and dead were separated from the living, but within three days only four remained alive; of these four only one survived to enter the chrysalis state, and this one did not mature the perfect insect, hence I am indebted to Mr. James Fletcher for the determination of the insect, who, being on the spot, succeeded in rearing several specimens of the moth.

A few days later complaints were made to me of the depredations of the caterpillar of another of our cut-worms, a species usually very common, the larva of a moth known to entomologists as *Hadena arctica*, which was very destructive to corn and other crops. A few days sufficed to mature the swarms of both these devastating armies, when those caterpillars which had escaped both disease and enemies buried themselves in the ground and changed to chrysalids, which subsequently produced the winged moth.

Every season these cut-worms are a source of great annoyance to gardeners and farmers, who find their young corn, cabbages, tomatoes, melons and other plants of succulent growth suddenly cut down by an unseen enemy and withered. Stalks of wheat and other grain are often cut in a similar manner by the same enemies, and they being universally distributed and extremely voracious, inflict enormous losses every year. They have received the name of cut-worms from their habit of cutting off near the base tender and succulent plants, and under this common designation there are included a number of species having similar habits, belonging chiefly to the genera *Agrotis*, *Hadena* and *Mamestra*, some of which possess striking points of difference in the moth state, although they much resemble each other while in the caterpillar condition. The general history of these cut-worms can be given in a few words. The eggs are laid by the parent moths during the latter part of the summer, sometimes on the ground about the roots of grass and other plants, and sometimes on the leaves near the ground. Within two or three weeks young larvæ hatch from these eggs, and by the time autumn sets in the caterpillars have attained the length of half an inch or more, when they burrow into the ground deep enough to protect them from injury by

severe frost, and there remain in a torpid condition all the winter. The warmth of spring arouses them to activity, when they seek the surface of the ground, feeding at night on almost any green thing they meet with, eating with almost insatiable appetites as they approach maturity, and burying themselves during the day under the surface of the ground in the neighborhood of their depredations. When full grown they burrow in the earth to varying depths, and there change to chrysalids from which the mature insects escape in two or three weeks.

These insects are hurtful only while in the larval condition. As remedies, showering the plants with Paris green and water, sprinkling them with air-slacked lime or powdered hellebore, or strewing lime or soot, or mixtures of these substances around the plants on the surface of the ground, have all been recommended, and in some cases have been found useful. Plants have also been protected from injury by these caterpillars by strewing around them a little dry sand impregnated with coal oil, in the proportion of a teacupful of coal oil to a pailful of sand, thoroughly mixed; the application should be renewed every week. This method of warding off the attacks of injurious insects by the use of odorous substances repugnant to them, is rapidly growing in favor on account of the success attending its use. This coal oil remedy for cut-worms is said to be very effectual, and the cost of the application being so trifling, its usefulness should be extensively tested. It is manifest that none of these measures are feasible where field crops are invaded, as the area would be too great for any one to undertake to cover with such material. In such cases nature has provided efficient remedies to reduce the numbers of such injurious species. Besides the disease to which I have referred, there are armies of parasitic insects which prey on them. Some of these directly devour their living prey, others deposit eggs within the bodies of their victims, which hatching into grubs, consume them. Hence it often occurs that an insect which is very abundant one season is scarce the next.

These cut-worms are very widely disseminated. Early in July I received specimens from Manitoba from the Deputy Minister of Agriculture, of a caterpillar belonging to this group, which was found to be seriously injuring vegetables, and in some localities oats and barley also. This was a grayish-brown caterpillar with a semi-transparent skin, a brown horny head and a shield of the same character on the upper part of the second segment. There was a pale line down the back, two similar lines along each side, and a white band lower down, close to the under surface.

One of them was reared through all its stages, and produced a neat and rather pretty moth, known to entomologists as *Agrotis declarata.*

That destructive pest, the wheat midge, *Cecidomyia destructor*, which has entailed so much loss on our farmers in years gone by, has prevailed during the past season to a considerable extent throughout the western part of our Province. Alarming reports were sent to me from various districts, and on the 16th of July a tour of inspection was undertaken for the purpose of ascertaining the extent of the injury. During a drive of over 100 miles, in company with Mr. J. M. Denton, one of the members of our Council, the wheat fields were examined and midge was found generally distributed, but nowhere in any very great numbers. Some varieties of wheat were much more injured than others; that known under the names of Michigan Amber and Egyptian seemed to suffer much. Among the varieties almost free from this trouble the Democrat wheat was one of the most esteemed. The selection of some of the best of the so-called midge proof varieties for seed, the kernels of which harden so early in the season that the larva is unable to feed on them, is assuredly one of the most practicable methods of lessening the depredations of this troublesome insect.

The Colorado potato beetle, *Doryphora decemlineata*, is still further extending its ravages. Having reached the Atlantic seaboard in the east, its further progress in that direction has been arrested; it is now extending its domain over the fertile fields of the North-west. Specimens have been sent to me this season from Portage-la-Prairie, where they are said to be confined to the neighborhood of the town, and having been rigorously assailed with Paris green, it is hoped that they have been pretty well exterminated. Through the kindness of Acton Burrows, Esq., the efficient Deputy Minister of Agriculture in Manitoba, I have received information of the appearance of this pest in the counties of Manchester and Dufferin, in the same Province, but in none of these localities has the insect yet made much headway.

Grape growers in some sections of Ontario suffered much early in the season from injuries caused by the grape-vine flea-beetle, *Graptodera chalybea.* This insect, which is about three-twentieths of an inch long and varies in color from a steel blue to green, passes the winter in the perfect state, hybernating under dead leaves and other rubbish, and awaking from its long slumber in early spring, proceeds to satisfy its vigorous

appetite by consuming the tender buds of the grape-vine, just as they are swelling. These insects have been so plentiful in some vineyards that the crop has been almost destroyed. Where they prove troublesome they may be collected by spreading sheets on the ground under the vines and jarring the canes early in the morning when the beetles are in a torpid condition, or they may be poisoned by syringing the swelling buds with Paris green and water.

The plum curculio, *Conotrachelus nenuphar*, continues its mischievous work in most parts of the Province where plums are grown, and the labor attending the jarring of the trees for the purpose of capturing and killing the insects deters many from undertaking the cultivation of this useful fruit. From the evidence thus far obtained it would appear that the remedy which has been found so efficacious in subduing the codling moth of the apple, namely, Paris green and water in the proportion of a teaspoonful of the poison to a pailful of water, will also protect the plum crop from the ravages of curculio. This remedy should be extensively tried by thoroughly syringing the trees with it as soon as the fruit has set, and repeating the application in a few days should rain occur to wash it off. Should this remedy prove uniformly successful a great stimulus will be given to plum culture. During the past season the plum crop on my own grounds was a failure, the trees having had but very few blossoms. In the absence of plums the curculios deposited their eggs freely on the pears, manifesting a special fondness for Clapp's Favorite. Although I watched them carefully, I failed to find a single example where the insect matured in this fruit. The only effect observed was a slight disfigurement in the form of the fruit and the production of a hard spot where the incision was made. While collecting moths at sugar early in the season, I observed one evening about nine o'clock, among the insects which came to sip the sweets, two specimens of the plum curculio. I captured one of them, the other fell to the ground before I could secure it. Experiments made by me some years ago proved that this insect is active at night as well as in daylight, but this is the only instance I have known of its being attracted to sugar at night.

From one locality complaints reached me about the middle of June last of the abundance of a spiny caterpillar feeding on currant bushes, which my correspondent supposed to be a new currant worm. Specimens were forwarded and proved to be the caterpillar of the gray Comma butterfly, *Grapta progne*. This insect may be found almost every season in

limited numbers on the wild gooseberry and currant bushes in open woods, and occasionally on the cultivated varieties, but this is the first instance to my knowledge where the insect has appeared in sufficient numbers to cause injury. They are so very subject to parasites that it is not at all likely they will ever prove generally destructive; syringing the bushes with Paris green and water, or dusting the foliage with powdered hellebore, will soon make an end of them.

In the neighborhood of Drummondville several acres of red raspberries were stripped of their foliage by the larva of the raspberry sawfly, *Selandria rubi;* reports of injury from this pest have also been received from several other localities. It is a green worm which is so exactly of the color of the young foliage it feeds on that it frequently escapes detection. When examined this larva is found to much resemble that well known pest, the currant worm, but it has no black dots. If allowed to pursue their course they soon riddle the leaves, leaving little more than a net-work of the coarser veins. An application of hellebore mixed with water, in the proportion of an ounce of the powder to a pailful of water, speedily destroys them.

A new clover insect has recently invaded our Province which promises to be troublesome. It is a small curculio known to entomolgists as the punctured clover-leaf weevil, *Phytonomus punctatus.* It is said to have been introduced from Europe within the past few years. The late Dr. LeConte, in a work published in 1876, reports having received one specimen from Canada, but at that time nothing seemed to have been known of its habits. In 1881 Prof. Riley published in the *American Naturalist*, an account of the injury done to clover fields in Yates county, New York, by this insect; in one instance in a patch of two acres scarcely a whole leaf remained. The beetle is about two-fifths of an inch long, of a dark brown color, marked with dull yellow, and has its wing cases thickly punctured. Each female is said to deposit from 200 to 300 eggs, which are sometimes laid on the surface of the leaf stem, but more frequently thrust into the interior of the older stems. The young larvæ may be found as early as in May, but being small they do not usually attract notice until almost a month later. At first they feed among the folded young leaves or attached to the under side of a leaf. When approaching full growth they feed chiefly on the margins of the leaves, into which they eat irregular holes. At this period they are not easily seen, as they relax their hold and drop suddenly to the ground when approached; moreover, they feed

chiefly during the night and hide in the day time among the roots and stalks of the plants. When full grown the larva spins a small cocoon, which is usually placed a little below the surface of the ground, in which it changes to a chrysalis: about three weeks later the beetle escapes. From observations which have been made on this insect at the Department of Agriculture, in Washington, the average period required from the time of the depositing of the egg to the escape of the mature beetle is three and one-third months, hence in most localities there will be two broods during the summer. Mr. A. H. Kilman, one of our members residing in Ridgeway, was the first to report the occurrence of this pest in Ontario, which he says was wafted to our shores by prevailing east winds, about the 10th of August last. On this date the beetles appeared on the opposite side of Lake Erie, in Buffalo, in such multitudes that thousands of them were crushed on the pavements by the feet of passers by. Mr. Kilman says: "I picked them from the fences and sidewalks, and found them in the grass in my lawn; I am of opinion that they will go into winter quarters here and open up a lively campaign in the spring. Whatever the sequel may show, I fear these invaders will prove of better staying qualities than those who crossed the border in '66, and turned to the right about at Ridgeway because Canada was not the 'clover patch' they were looking for."

As the larvæ will be found most numerous in the latter part of May or early in June, it is recommended that the clover should be heavily rolled at that time for the purpose of destroying them. If badly infested fields were ploughed about this period, the destruction of the insects would be still more certain.

Early in the summer alarming accounts were received of another insect injuring the maple trees, especially the shade trees on streets and avenues. This was a species of Coccus or bark-louse, *Pulvinaria innumerabilis*, which forms brown scales on the branches, from under one end of which there protrudes a cotton-like substance, forming a tuft about four times as large as the scale in which the eggs of the insect are lodged. In a short time there issues from this egg-nest a multitude of minute yellowish white lice which distribute themselves over the branches, and locating on the succulent portions, pierce the tender bark with their sharp beaks and subsist upon the sap. These young lice soon become stationary, gradually increase in size

and reach maturity towards the end of the season. They chiefly affect the underside of the limbs and branches.

Remedies.—The branches may be rubbed with a stiff brush or broom, which will dislodge many of the insects, and then washed with a liquid made of soap diluted with lye or solution of washing soda, or with an emulsion of coal oil made as follows: Take one pint of coal oil and agitate vigorously with an equal quantity of milk until the compound assumes a creamy appearance, when it should be diluted with about ten times its bulk of water and applied with a brush or syringe.

This pest has occured in many localities in Western Ontario, also in Michigan, New York and Pennsylvania.

That cosmopolitan butterfly known as the painted lady, *Pyrameis cardui*, has been very abundant the past summer, not only in Canada, but also in most of the Northern United States. From Mr. Burrows I learn that in Manitoba the larvæ appeared in such countless hosts as to cause much alarm, and reports were current of their having injured some of the growing crops. This, however, is improbable, as it devotes its attention mainly to devouring thistles. Occasionally specimens have been found feeding on mallow, hollyhock, wild sunflower, burdock, and several other plants, none of which, however, are of any economic value.

A lively interest is being awakened in reference to the insects inhabiting our Northwest Territories and British Columbia, of which we as yet know comparatively little. Captain Gamble Geddes, of Toronto, has made excursions to several of these distant points and brought home many rarities. From the Moose Mountain district in the Province of Assinaboia, a number of interesting specimens have been received, collected by Miss F. M. Pierce. Prof. Panton, of Winnipeg, has been collecting in that neighborhood, and in British Columbia we have a most efficient helper in the person of Mr. G. W. Taylor, who has recently published in the CANADIAN ENTOMOLOGIST, lists of some of his captures in the neighborhood of Victoria. It is sincerely hoped that other observers will be induced to labor in these most interesting and promising fields.

On the 30th of January last, the House of Commons at Ottawa resolved to appoint a select committee to inquire into the best means of encouraging and developing the agricultural industries of Canada. Circulars were prepared by the committee embracing a series of questions which were sent to most of the prominent agriculturists and scientific men in the Dominion, to which several hundred replies were received. The

practical bearing of entomology on agriculture was fully recognised by the committee, and the questions so framed that a very large amount of information on this subject was gathered. Our Vice-President, Mr. James Fletcher, was summoned to give evidence in reference to injurious and friendly insects; so also was Mr. W. H. Harrington. A report has been issued covering 218 pages, containing the evidence and a summary of the replies to the questions. It is gratifying to find that the close relationship between entomology and successful agriculture is beginning to be more fully realized, and that the work of our Society and the efforts of entomologists generally are so well spoken of as they are in this document.

Continued efforts are being made by our Society to obtain and disseminate correct information, especially in reference to those insects injurious to agriculture. With this in view we have lately issued a number of blank forms for describing insects, which will be sent to any one desiring them on application to either of the officers in London. By this means we hope to secure fuller details and more uniform descriptions of insect pests, so that they may be more readily determined. The officers and members of the Council have also embraced every opportunity afforded them of visiting localities affected by destructive insects, and have endeavored to disseminate among the sufferers practical information in regard to the most effective remedies for such evils. The demand for our Annual Reports from all parts of the world has much increased since the publication last year of the general index. It is a matter of regret that the issue of several of the earlier reports is entirely exhausted, and there is now no means of supplying the demand. Our monthly journal, now in the sixteenth year of its existence, continues also to grow in public favor.

During the past year reports of great value in reference to destructive insects have been published by the Department of Agriculture, at Washington, under the able direction of Prof. C. V. Riley. A most excellent and voluminous report from the pen of Prof. J. A. Lintner, State Entomologist, has been printed and distributed by the State of New York. Much useful work has also been accomplished in the same direction by Prof. A. S. Forbes, State Entomologist of Illinois; by Prof. Herbert Osborn, of the Iowa Agricultural College, and others. Many additional parts have appeared of that superbly illustrated work on North American Butterflies, by Mr. W. H. Edwards; the same talented author has also now in the press a revised catalogue of the butterflies of North America. The recent meeting of the Entomological Club of the American Associa-

tion for the Advancement of Science, held in Philadelphia, was one of unusual interest, most of the leading entomologists on this continent being present. A full report of the proceedings has been prepared.

In concluding, permit me to urge upon you all renewed diligence in your studies of insect life ; be patient and faithful in observing, be prompt in publishing the results of your observations. The field we labor in is so vast that life is too short to permit any one of us to do much, especially when the limited time is taxed by other pressing engagements. Nevertheless, let us do what we can to unravel the mysteries relating to these much-despised atoms of existence ; the opportunity is ever before us,

> "Ten thousand forms, ten thousand different tribes,
> People the blaze of day."

And when the brightness of the sunshine has faded, there are tribes equally numerous and attractive which rise not from their couch until their more obtrusive brethren have retired to rest. Whether it is ours to employ portions of the night or the day in this charming occupation, we shall not in either case fail to find manifested in beauty of form and in the instincts with which these tiny creatures are endowed manifold evidence of the wisdom and goodness of the great Author of Life.

ELECTION OF OFFICERS.

The following named gentlemen were then duly elected as officers of the Society for the ensuing year :

President, William Saunders, London, Ont.

Vice-President, James Fletcher, Ottawa, Ont.

Secretary-Treasurer and Librarian, E. Baynes Reed, London, Ont.

Council : Rev. C. J. S. Bethune, M. A., Port Hope ; Rev. J. W. Fyles, South Quebec ; W. H. Harrington, Ottawa ; J. M. Denton, London ; J. Alston Moffat, Hamilton.

Editor "Canadian Entomologist," William Saunders, London.

Editing Committee, Rev. C. J. S. Bethune, J. M. Denton, James Fletcher, and E. Baynes Reed.

Auditors, W. E. Saunders, H. P. Bock.

Delegate to "Royal Society," W. H. Harrington.

DISCUSSION.

On motion of Mr. James Fletcher, seconded by Rev. J. W. Fyles, a vote of thanks was unanimously tendered to the President, Mr. Wm. Saunders, for his able and interesting address.

In proposing this vote, Mr. Fletcher said that he should like to make a few remarks concerning some of the subjects alluded to in the address, particularly with regard to the cut-worms referred to in the earlier part, which he had especially investigated by instruction of the President, and upon the occurrence of which he had prepared a short note for the Society. He stated that the injury done by *Agrotis fennica* at Ottawa, in the month of May last, was very great. He had received reports of its ravages early in the month, and in all cases those inquiring for remedies stated that the insects were new to them. The first specimens sent were taken in large numbers under strawberry plants, and were about half an inch in length. After a few days reports came in *from all quarters, of their devastation*, which was worst about the 22nd May, when, the President being in Ottawa, he had, together with Mr. Harrington and himself, visited one of the most seriously injured farms two miles from Ottawa, where they had found the larvæ in vast numbers attacking the clover in a field of fodder, but leaving untouched the rye which was growing with it. At first it was supposed by the farmers that the insect was the Army Worm, but the larva upon examination was found to be quite different, being of a deep velvety black with indistinct white lines. It was found to be chiefly nocturnal in its habits, and to possess characteristics of the ordinary cut-worms, lying hid beneath the surface during the day, and destroying everything within its reach at night. They were also climbing cut-worms, and had done much damage by eating out the leading shoots in some young trees Mr. Fletcher was growing from the seed for examination; oak, black walnut, horse chestnut, elm, negundo and maple, all had suffered. It seemed that during the last stage the larvæ were much more active during the day time, and did not hide under the surface. Just before the pupal stage an enormous fatality was caused by a fungus disease which attacked the larvæ and which caused them to decay very rapidly. In certain fields they could be seen in large numbers on the stems of grass and other plants which they had crawled up, and to which they were fixed by the fungus which seemed in nearly all cases to develop just below the head in the shape of a small tuft of white downy matter; after a short time the bodies dried up. Large numbers had also fallen a prey to parasites, and as many as three ovæ of a *Tachnia* fly had been found on some specimens. Mr. Fletcher had only succeeded in rearing about a dozen imagines, nor had the moth been very common during the summer, although a few had been taken.

With reference to the Manitoba cut-worm, referred to by Mr. Saunders, he had succeeded in bringing to chrysalis three of the four larvæ sent to him by Mr. Acton Burrows, the Deputy Minister of Agriculture for Manitoba; of these when the moth emerged one proved to be *Agrotis devastator*, and the other two had been sent to Mr. J. B. Smyth, of New York, for identification. They were very dissimilar in color, but the markings seemed to be the same on each.

Mr. Fletcher also stated that during the month of July he had found a small *Phytonomus* committing great damage in the clover at Dalhousie, New Brunswick.

He had taken it for *P. nigrirostris* at first, but fancied it might be a different species, as nearly all the specimens bred were light cinnamon brown in color*.

He found that its habits differed considerably from those of *P. punctatus* as described in Prof. Lintner's first report. He had brought specimens for the members, and as he had prepared a note of the insect for the Society he would not say more then. He had found a cocoon on clover at Brome, in the Eastern Townships.

Mr. J. Alston Moffat here exhibited specimens of the true *P. punctatus* which he had received from Mr. Kilman, Ridgeway. Resuming his remarks, Mr. Fletcher said that he had obseved enormous damage done by the Larch saw fly, *Nematus Erichsonii;* he had first noticed it near Quebec, and had traced it all down the Intercolonial Railway, wherever any Larch trees occurred, as far as Dalhousie, where he found it abundant. He exhibited interesting specimens of young twigs of *Larix Americana* which he had received the previous week from the Rev. Mr. Fyles, from Quebec, in which the leaves of the tree, although eaten down to the base by the larvæ, had later in the season, after the attack ceased, been able to grow about a quarter of an inch. Mr. Fletcher thought that this fact, that the tree was able to produce this after-crop of foliage, was one of very great importance, as the tree might by this means be able to withstand the insect for a much longer period; he anticipated that some remedy, either artificial or natural, would be found before long.

He exhibited a small Homopteron, *Podisus modestus*, which he had found destroying the larvæ at Brome, P. Q., on the estate of S. A. Fisher,

* Since identified as *Phytonomus nigrirostris*.

Esq., M. P., who had given him assistance, and provided him with facilities for examining this pest.

The Rev. T. W. Fyles, of South Quebec, said it afforded him much pleasure to second the vote of thanks to their President. Referring to the fungous disease upon the cut-worms mentioned by Mr. Fletcher, he said that he had known in England many years ago of an insect similar to this being attacked by some such disease as had been described. He spoke of the habits of cut-worms, saying that as they did not tunnel their way from plant to plant, but passed over the surface, a circle of salt placed round each plant at a short distance would probably save it; the larvæ would shun the salt. Besides this there was the remedy of "hilling up" the plant; he had found that the larvæ would not climb a mound on account of the particles of earth giving way. He believed that salt in the early stages of the plants and the mounds of earth afterwards, would amply protect corn, etc., from the attacks of the insects.

He next spoke of the potato beetle, *D. decem-lineata*, and expressed his belief that its numbers and vigor were decreasing in the Province of Quebec. He stated that there were places on the Lower St. Lawrence where it had not appeared.

He next remarked that *Nematus Erichsonii*, the Larch saw-fly, had extended its ravages along the Beauce Valley to the neighborhood of Quebec, where it had stripped the tamaracks (larch) bare. A second growth of leaves had appeared, and this probably would save the trees. If, however, the attacks were repeated to the same extent, he believed the trees would die. Mr. Fyles showed specimens of the insect and of its cocoons.

Mr. J. Alston Moffat, of Hamilton, stated that he had lately received from his friend, Mr. J. B. Hay, of Brantford, some specimens of a beetle that had been found attacking hot-house plants, *Abutilon*, *Roses*, *Plumbago*, etc. The insect being new to him he sent it to Dr. Horn for identification, and received the follow letter from him :—

Philadelphia, Pa., Oct. 10th, 1884.

Dear Sir : The insect you send is *Aramiges Fulleri* Horn. (Fuller's rose beetle). It is widely scattered over the country, and has been reported to me as damaging many hot-house plants, particularly the thick leaved varieties. It seems a great nuisance, and eight years ago appeared to be rare. G. H. Horn.

Specimens of this insect were exhibited by Mr. Moffat.

The President, in referring to the work of the special committee appointed by the House of Commons in February last to inquire into the condition of agriculture, said that the members would be much pleased to learn that as one of the results of that inquiry, Mr. Fletcher had been appointed Honorary Entomologist to the Dominion Department of Agriculture. It was much to be desired that this appointment should become permanent, for the Society cordially recognized the special fitness of Mr. Fletcher for this important position, and believed that he would accomplish much good work in this connection.

Mr. Reed exhibited a colored photograph presented to the Society by Mr. Alfred Wailly, an English member of the Society, representing an extraordinary aberrant form of *Attacus cecropia*.

Mr. Fletcher stated that he was happy to announce that during the past summer, under instructions from Dr. Selwyn, F. R. S., Director of the Geological Survey of Canada, an interesting collection of Lepidoptera had been made in the Lake Nepigon region by Prof. Macoun and Mr. William Macoun, and that these having been submitted to him for identification, he had found many very valuable insects, included among which he made special mention of two species of *Chionobas*, *Colias eurytheme*, *Colias interior*, a species of *Chrysophanus*, which was possibly new, and *Alypia MacCullochii*. By means of these instructions to the surveyors it was hoped that much useful information would be obtained of the insect fauna of these newer parts of the Dominion that were being explored and opened up for occupation.

Mr. Fletcher remarked that we have heard a good deal of rubbish in the newspapers, etc., about nothing being done by the members of the Geological Survey. He hoped that it was unnecessary to say that these reports were entirely without foundation, and, at any rate, the present action of the Director would prove to all entomologists that he appreciated the value of their scientific researches.

The evening being somewhat advanced the Society adjourned until 9 o'clock next morning.

Thursday Morning, October 16.

The Society re-assembled at their rooms at 9.30. The President in the chair.

Mr. W. H. Harrington stated that *Phytonomus nigricornis* occurred in considerable numbers in the vicinity of Ottawa, but that he had not

found any evidences of the destructive habits described by Mr. Fletcher. It was, however, known to attack clover in Europe.

He mentioned several insects found by him on Larch, such as *Urocerus flavicornis* and *Buprestis maculiventris*. During the previous summer he had, in company with Mr. Fletcher, noticed a grove of tamarac with trees in various stages of health and decay, and the cause of the latter seemed undoubtedly to be a species of *Dendroctonus*, which was found in immense numbers under the bark of sickly and dying trees. The bark was completely undermined and riddled by its galleries, and swarmed with larvæ pupæ and beetles. Associated with them were large numbers of a smaller bark-borer, *Hylesinus opaculus*, with one or two other species, which would not be likely, from their habits or numbers, to do much injury. Examination of dead trees showed that the bark had been destroyed in the same manner, but now contained no beetles.

In reply to a question as to whether such bark beetles ever attacked living and healthy trees, Mr. Harrington answered in the affirmative, and instanced a species which he had during the spring found boring into and through the terminal buds of *Pinus strobus* (white pine) and thus destroying them.

EXHIBITION OF INSECTS.

Mr. Harrington exhibited a small collection of about 50 species of Coleoptera taken by him at Sydney, Cape Breton, during a visit of a few days in September, also specimens of the Chinch bug which he had found abundant there ; he also exhibited a *Chalcophora liberta*, with deformed thorax, a *Trogosita mauritanica*, with deformed head, and a wasp (Vespa?) with one of its antennæ curiously deformed.

Rev. T. W. Fyles showed specimens of *Colias eurytheme*, *Pieris Manitoba*, *P. centaureæ*, a female of *Smerinthus cerysii*, and other rare insects.

Mr. J. Alston Moffat showed a collection of rare and interesting insects, both Lepidoptera and Coleoptera.

Mr. Fletcher exhibited a collection of 40 specimens of *Colias philodice*, showing many curious varieties. Two specimens of *Colias eurytheme*, one of which was the autumn form bred from the egg. Two specimens of a small moth bred from larvæ found boring in the flowers and capsules of *Nelumbium luteum* at Chicago. A specimen of *Sphinx luscitiosa*. A *Hepialus* taken at Dalhousie, N. B., very similar to *H.*

argenteo-maculata, but smaller, and having 4 spots on the primaries. Two specimens of a *Chrysophanus*, taken by Mr. A. Macoun, at Nepigon. Specimens of *Agrotis fennica*, and other rare Lepidoptera taken during the past season.

Rev. T. W. Fyles exhibited specimens of mud wasps' nests, taken at Compton, from which he had obtained grubs that produced a species of Ptinidæ.

Mr. J. M. Denton showed some Philadelphia raspberry canes which were badly injured by some borer not determined.

The President exhibited two boxes of insects which had been lately received from Miss F. M. Pierce, of Moose Mountain, Assinaboia, who had sent the specimens as a first collection. The boxes proved of great interest to the members present.

The Secretary exhibited the beautiful silver medal which had been awarded to the Society by the International Fisheries Exhibition. The medal was much admired.

In presenting a collection of diurnal Lepidoptera from Mr. S. W. Taylor, of Victoria, Vancouver Island, Mr. Fletcher stated that he considered one of the chief advantages of having the annual meeting at London was that the members could see in what species the Society's reference collection was deficient, and he was sure that they all felt the necessity of making the collection as complete as possible. For his own part, he would much prefer giving any unique specimens he might take to the Society, rather than have them hidden away in his own collection where only a few could see them. He had now very much pleasure in presenting a small but valuable collection of specimens to the Society from his friend, Mr. S. W. Taylor, of Victoria, B. C. Mr. Taylor, although one of our new members, had already done good work. Mr. Fletcher also distributed among the members a packet of duplicates, sent for that purpose by Mr. Taylor, among which were specimens of a *Melitæa* provisionally named *rubicunda*, but which were not considered typical by Mr. W. H. Edwards; of this species, however, Mr. Fletcher had received larvæ, some of which were in his own hands, and some had been forwarded to Mr. W. H. Edwards.

The President expressed the pleasure Mr. Taylor's liberality had given him and the gratification he felt that the Society's collections were so much appreciated; a vote of thanks was given to Mr. Taylor for his donation.

Mr. Harrington stated that *Oberea tripunctata* had been found very abundant at Ottawa. He remembered it also as being general in 1873.

Mr. Reed called attention to an extract from a newspaper showing that railroad cars may often be the vehicles of carrying destructive moths from one part of the country to another. The extract stated that the writer was often struck by the number of "*Aletiæ*" on the trains, and that he had observed that there was a sort of coincidence last season between lines of railroad and abundance of cotton worms.

Mr. Reed said that he had noticed fewer specimens of *Aletia* this year than for some seasons past, although a few had within a few days been caught in his residence.

Mr. Reed also said that *Aegeria acerni* had been very prevalent in the neighborhood of London this season.

Rev. Mr. Fyles reported that *Aegeria tricincta* had been taken at Como, P. Q., and also that he had taken two larvæ of *P. satellitia.*

Mr. Fletcher showed an aberrant specimen of *Notodonta americana* that had emerged from basswood in autumn instead of spring; he also reported the capture at Ottawa of *Ellema Harrisii.*

An interesting discussion then took place on the transmission of insects through the mail, and the best method of relaxing specimens.

In answer to Rev. Mr. Fyles, Mr. Fletcher said that we had not in Canada any plant which could be used as a substitute for the Laurel so extensively used by European entomologists, not only for killing the insects, but for keeping them for a long time in a relaxed condition without spoiling. He had tried the young leaves of some of the different species of wild cherry, which contain prussic acid; but had found that although it killed the insects, it soon became mouldy.

Mr. Reed had found moist sand an excellent means of relaxing Lepidoptera, and boiling water for Coleoptera.

The meeting finally passed a resolution requesting Mr. J. Fletcher to prepare for the use of the members a short circular giving instructions for relaxing specimens, and also the best plan of packing them for transmission through the mail.

This Mr. Fletcher undertook to do, remarking that he himself had found the process of nature-printing a very useful mode of sending Lepidoptera for identification.

(To be Continued.)

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., DECEMBER, 1884. No. 12

NOTES ON LARVA OF EUCHAETES EGLE, CLEM.

BY G. H. FRENCH, CARBONDALE, ILL.

On July 5th, 1884, several larvæ of this species were handed me by a neighbor, who had found them feeding on *Asclepias quadrifolia* growing in the yard. They were just ready to pass the last moult, evidently leaving the plant for the purpose of moulting; some of them being found on a fence attracted the notice of the person finding them. As found they were .55 of an inch long; body brownish black, each joint with eight tubercles from which project tufts of hairs. Those from the four dorsal, on joints 2 and 3, are long and black, part of those on joint 4 are white; the posterior three joints also supporting long tufts. The dorsal tufts between these are ochre colored, about a third as long as the anterior or posterior, and bend towards the centre from each side. The lower tufts on the anterior part of the body are gray, the rest black. Head black.

July 8, 9 and 10 quite a number more were found; both they, and those in my breeding case, had moulted and returned to the food plant. They must have gone quite a distance from the plant, as the fence and other things for several feet around were carefully examined upon finding the first, but only three or four were left feeding on the plants.

At this time they were .80 of an inch long; body velvety black, each joint with ten tubercles, from each of which arises a spreading cluster of hairs. Besides these, on the dorsal tubercles of joints 3 to 5 and 12 and 13, are pencils of finer hairs .25 of an inch long. All the hairs on joint 2 are white, short and point forward. In some specimens part of the dorsal pencils on joints 3 and 5 are white; also part of the hairs on joint 12 white, in others all are black. The dorsal pairs of tufts on joints 6 to 11 are turned towards each other so as to make a complete ridge, the others on the sides point outward. The pencils on joints 6 to 11 are about .15 of an inch long. Those on the back have the centre hairs ochre with black underneath; the laterals are black. Each one of the long hairs

under the glass is seen to be covered with a soft pubescence that makes it more like a downy feather than a hair. Head jet black, base of clypeus and antennæ white; tips of prolegs pale.

On most of the specimens the lower spreading tufts of hairs on the extremities of the body are white, the rest black; but I find some with all the lateral spreading hairs white, and also the lateral pencils on joints 6 to 11. In others the spreading hairs are gray and the lateral pencils black; but these variations are the exception. Each tubercle gives rise to two sets of hairs, a short spreading bristle-like set, and in the centre a pencil of the plumose sort.

July 11 they began to spin, and by the 16th all had disappeared. They produced the imagines from July 28th to 31st, 54 coming out in all, only 6 of which were ♀. Some of the females deposited eggs, which were .025 of an inch in diameter, globular, white, smooth. These were deposited in irregular clusters, some in the roof of the cage and some partly around a twig, but all of them were covered more or less completely by hairs from the last joint of the abdomen of the female. The tufts of whitish hairs found on the tip of the abdomen of this species seems to be for that purpose. After the cluster was completed the female would rub the end of the abdomen all around it and over it, nearly denuding herself of these hairs.

These eggs were watched for a number of days, but as they did not hatch they were not noticed further, it being supposed that they would hibernate. Afterwards it was found they had hatched and the larvæ died. While in confinement the larvæ were fed on *Asclepias tuberosa*, which they ate readily, but they refused to eat *A. purpurascens*.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

(Continued from page 220.)

PAPERS READ.

The Rev. Mr. Fyles read a paper describing the habits of an insect forming galls upon *Vaccinium canadense*, and exhibited specimens and microscopic drawings of the insect.

Mr. Harrington read an abstract of a paper on the Tenthredinidæ, or saw-flies.

Mr. Fletcher gave an abstract of a paper he had prepared detailing some experiments he had made in breeding some Coliads from the egg. He said he thought that the thanks of the Society were especially due to Mr. W. H. Edwards for his most valuable papers published in the CANADIAN ENTOMOLOGIST during the past year, and he was of opinion that they could not fail to have important results. Having been induced himself by these articles to take up this fascinating branch of entomology, the results had been such that he considered them worthy to bring before the members at this meeting. He had been fortunate enough to secure a very much worn female of *Colias eurytheme*, summer form *eurytheme*, from which he had succeeded in breeding a lovely female specimen of the autumn form, *keewaydin*. Thinking it would be interesting to compare the larvæ stage by stage with *C. philodice*, he had obtained twelve eggs of that species from a typically marked yellow female, on the same day as the eggs of *C. eurytheme* were laid, and he gave a short account of the differences noted between these larvæ at the different moults, and exhibited a beautiful series of specimens of *C. philodice*, drawing attention to the different variations in the markings. The brood of twelve bred at the same time as *C. eurytheme*, were very interesting, consisting of three males, four ordinary yellow females, three albino females, and one yellow female with very dull markings ; one larva was destroyed by the larva of a Tachina fly.

Rev. Mr. Fyles read an interesting paper on the Neuroptera and their relation to the fishing interests.

Also a paper on the occurrence in the Province of Quebec of the Croton Bug, *Ectobia germanica*.

The President then read an interesting paper by Mr. G. J. Bowles, on ants.

The meeting decided that these papers should be submitted for insertion in the Annual Report.

Mr. W. A. Macdonald, agricultural editor of the *Farmer's Advocate*, took the opportunity of expressing the pleasure he had derived from listening to the interesting discussions which had taken place during the meetings, and to the vast amount of information thus given. He had found these meetings so profitable that he hoped to have the pleasure of attending them another year. The Entomological Society of Ontario, he said, was doing a good work in gathering and distributing information in

reference to the many insect pests which our farmers and fruit growers have to fight with, and he should be glad to render it any assistance in his power.

The meeting then adjourned.

LIST OF DIURNAL LEPIDOPTERA TAKEN IN THE NORTH-WEST AND ROCKY MTS., SEASON OF 1884, WITH LOCALITIES.

BY CAPT. GAMBLE GEDDES, A. D. C., GOVERNMENT HOUSE, TORONTO.

107. Colias Meadii, Edw.; Laggan, C. P. R.
108. " interior, Scud.; Stephen, C. P. R.
109. Anthocaris hyantis, Edw. Kicking Horse Lake.
110. Argynnis triclaris, Hüb. ; Mount Lefroy.
111. Melitæa Geddesii, Edw. (nov. spec.) Canmore.
112. Phyciodes pratensis, Behr. ; Kicking Horse Pass.
113. Grapta zephyrus, Edw.; Laggan, Summit.
114. Chionobas jutta, Hüb.; Emerald Lake.
115. Chrysophanus dione, Scud.; Calgary, N. W. T.
116. Lycæna shasta, Edw.; Laggan, Rocky Mts.
117. " lycea, Edw.; Stephen, Rocky Mts.
118. " orbitulus, V. Prun.; Canmore.
119. " evius, Bd.; Castle Mountain.
120. Thymelicus hylax, Edw.; Laggan.
121. Euptoieta claudia, Cram.; Calgary.
122. Grapta J-album, Bd.; Kicking Horse Lake.

These species are in addition to the list published last season, and will add considerably to the Catalogue of Br. American specimens already known ; several of them have never been taken in Canada before.

Capt. Geddes will also publish a list of Heterocera taken in 1883-4, as well as Coleoptera, Neuroptera, Hymenoptera and Diptera, and, if possible, Orthoptera. This, it is hoped, will prove a useful guide to collectors in the North-West. A list of Micro-Lepidoptera will also shortly appear in the ENTOMOLOGIST.

NOTE ON CHALCOGRAPHA SCALARIS, LeConte.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

I may give an addition to my note (June, No. 6, p. 120, 1884). During the last seventeen years this beetle has never been rare in Cambridge, Mass., but never so overwhelmingly common as this year. As this elegant beetle was the first I had collected here in October, 1867, it had become my pet, and I paid some attention to it every year. This year it was very common on a long board fence in Ware St., which I have to pass four times every day. The fence surrounds a large garden with many elm trees near. When I heard that the beetle had been very destructive to elm trees in some places on the north side of the College grounds, and that it had nearly denuded some trees in Sommerville, I gave closer attention to it. Till June the leaves of the elms in Ware St. were comparatively uninjured. Then appeared the second brood of larvæ, and very soon the leaves were honeycombed with more or less round holes, and turned yellow prematurely. The larvæ were first described by Harris, Injur. Ins., 1841, and the same repeated in all following editions; the edition of 1862 gives a figure of the larva and beetles. A new and fuller description of the egg, larva and pupa is given by Dr. A. S. Packard, Insects Injurious to Forest and Shade Trees, 1881, p. 126. Harris says, Injurious Insects, 1862, p. 133, these beetles inhabit the linden and the elm. A. Fitch, Report V., p. 842, records them as injurious to the elm; common also upon willows. Packard, 1881, observed them very abundant at Brunswick, Maine. The numerous linden trees in the campus of Bowdoin College were infested to such a degree that nearly every tree, and in some cases nearly every leaf of a tree, was infested by the grubs. Packard, in Maine, had taken the beetle in coitu on the alder, where it is more common. I find no enemies mentioned, but I observed myself in August a nymph of *Podarcys spinosus*, after Mr. Uhler's determination, running after a young larva and spearing it dexterously through the anus. When I took both in a small box, they separated directly, but in opening the box ten minutes later, I found the larva again safely speared. The distribution of *C. scalaris* is very large; the Museum contains the imago and larva from the Saskatchewan River, Brit. Am., and from Lake Superior. It goes down through the Eastern and Middle States to Louisiana and Mexico, to Costa Rica (of Suffrian Stett. Ent. Zeit. 1858, p. 256). Westerly, Rogers (Proc. Ac. N. S. Phil., vol. 8, p. 32) quotes Nebraska.

Dr. Horn, CAN. ENT., 1884, p. 127, states why the name *Chrysomela scalaris*, given to the beetle, Ann. Lyceum N. H. 1824, vol. 1, p. 173, pl. 7, f. 18, was changed by Stal, Monogr. p. 261, in *Chr. multiguttis*, because Olivier had described in 1807 a *Chr. scalaris*. But as this species belongs to *Doryphora*, and LeConte's species to *Chalcographa*, this latter name can stand, and is in fact accepted by Jacoby, Biol. Cent. Am. vi., pl. i., p. 197, pl. xl., f. 6. Mr. Jacoby says: "A specimen from the collection of Sturm is labeled by him *C. rufipes*." The synonym of *C. lateralis* St. given in Gemminger's Catalogue must therefore refer to another species. But there is in Sturm's Catalogues from 1826 and 1843 nowhere a *C. rufipes* mentioned, which must be a collection name. The name *C. lateralis* is put by Sturm himself, Catal. 1843, p. 288, as a synonym to *C. scalaris* Dej., which is our species. The *C. philadelphica* Kirby, Tr. Am. Soc., is considered as a synonym of our species by Rogers, Suffrian, Jacoby. But Rev. Bethune, in his edition of Kirby's Fa., 1883, p. 96, unites it with *C. philadelphica* of Linnæus.

REMARKS ON CHRYSOMELA SCALARIS, LEC., CHRYSOMELA LABYRINTHICA, LEC., AND PHYSONOTA UNIPUNCTA, SAY,

BY F. B. CAULFIELD, MONTREAL.

Chrysomela labyrinthica, Lec. This insect is, I believe, by some entomologists thought to be a variety of *C. scalaris*, Lec. I incline myself to the belief that it is a distinct species, but my knowledge of it is too limited for me to form a decided opinion. Both forms occur here; *scalaris* is common wherever basswood or elm are found; *labyrinthica* is scarce, and as far as my experience goes, is confined to one locality, viz., that portion of the Mountain Park lying between the head of Redpath Street and the road through the Park. I have only found *labyrinthica* during the early part of summer; *scalaris* occurs both in spring and fall. Mr. Moffat, who records *labyrinthica* from Hamilton (CAN. ENT., vol. xiv., page 57), took a specimen on May 23rd, and found its season to last about four weeks, during which he took over a dozen. It appears to be very rare, and is in very few lists. Mr. Pettit does not give it in his Grimsby List. Mr. D'Urban records *scalaris* common at Montreal, but does not mention *labyrinthica*. The same author, in his list from the

Valley of the River Rouge, gives *scalaris* as "abundant on alders throughout the district, from the end of June to the end of September," but says nothing of *labyrinthica*. Mr. Ritchie gives both *scalaris* and *labyrinthica* in his Montreal List, but without dates.

In September, 1883, I found *scalaris* in great numbers in the crevices of the bark of elm trees at Cote St. Paul, about a mile from the locality where I find *labyrinthica*. I examined several trees and could have taken scores of *scalaris*, but did not see a single specimen of the other form.

Physonota unipuncta, Say. In the July number of the CAN. ENT., Mr. Hamilton asks for information concerning this insect. I find the form *helianthis* Rand. (3 black spots on thorax) common on what I take to be the wild sunflower *(Helianthus)*. It is double-brooded, occurring in June and again in August, but the broods when living present a very different appearance. The beetles of the first brood are entirely of a burnished gold color, and are exceedingly beautiful. The fall brood show no trace of the gold, and answer to Randall's description as quoted by Mr. Hamilton, except that I would call them blackish-green, etc. After death both broods fade to a dingy yellow, and are then exactly alike. I found what I took to be the larva common on the same plant, but did not make a description of them. As well as I can remember, they were different from those found by Mr. Hamilton. They were dark green in color, the margin not serrate or spined, and the tail, instead of being bifurcate, ended in a knot. They fed in company, and were constantly wet with semi-fluid excreta. As I did not pay much attention to them, the mature larvæ may have escaped my notice, and may have been similar to those found by Mr. Hamilton. I have not seen Randall's description, and do not know if he mentions the difference in color in the broods. In this locality all the beetles of the first brood were golden, and all of the second were blackish green, with yellowish white spots. Both beetles and larvæ were very sluggish.

[Read before the Montreal Branch, 11th Nov., 1884.]

THE PROPORTION OF THE SEXES IN CICINDELA VULGARIS, SAY, AND OTHER NOTES ON THE SPECIES.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The proportion of the sexes in insects often throws much light upon the habits and appearance of the species. Having had good opportunity to

make observations of this kind upon *Cicindela vulgaris* Say, in collecting a large number of the beetles, I have made out the appended table, which will explain itself. The dates I give, as they will show how the sexual proportion varies at different times of the season. From my observations it would seem that when the insects first appear in spring the females are much the more numerous ; but that when they first appear in fall the males outnumber the females as two to one. I have taken this species here from 3rd March (1882) to 25th October (1884).

The examination, as shown in the table, of over 1,500 specimens, as the figures stand summed up, shows the average proportion of males to females as 1.15299 + (approximately 1.153) to 1 ; or 115.3 males to every 100 females. The number examined being so large, the figures will be trustworthy. This is the average proportion through the whole year of those taken while out in their favorite haunts. I have also secured specimens in spring by digging them from their holes, where they had retreated on account of cloudy weather. All that I have ever taken in this manner have invariably been females. Some reference is made to this in the notes at the bottom of the table.

During the past few seasons I have amassed quite a stock of notes on this species, referring to many random observations on the perfect insects, the more important of which I will here give. As to variation in the elytral markings, many of the smaller specimens (generally ♂) have the bands narrowed into mere threads, being very much slighter than usual. The markings in both sexes vary from the full, broad bands or lunules to thin threads, and are sometimes partly defaced, as it were, at each end. Occasionally robust specimens (generally ♀) are found, which vary from the typical form by having the ground color of the upper parts very dark, approaching to black. In size there is also much variation ; large males and small females occur, though, as is well known, the reverse is the general rule. Small specimens with well developed lunules also occur, and large ones sometimes have them narrowed and fainter than common. The male sexual character of the creamy fronts of the mandibulæ is well known, but I have taken females with this character nearly as well developed as in the males.

The pleasant-scented fluid which is so copiously emitted from the mouth is generally of a brownish color ; however, in one specimen that I have noticed it was of a dirty greenish, while in another it was of a brick-red color. This fluid probably serves to soften the parts of insects to be

devoured, for I have noticed that where it comes in contact with the net, holes will appear much sooner than elsewhere. This also explains its sweet, honey-like smell, and probably taste, which it would need in order to make the insects' food agreeable to it. Undoubtedly this fluid helps much in digestion. When one of the beetles is held in the fingers, it will attempt to bite with its mandibles; but, finding it is unable to pierce the skin, it emits an abundance of the fluid upon it. Though it may not really intend to eat a person, this may be a mechanical action, which is performed whenever the insect feels a desire to use its jaws effectively.

When the female sexual organ is forced out, it is often found covered with a pure white milky fluid, but sometimes this fluid is of a drab color.

This species assimilates well in color with its surroundings, but of this I will speak more fully elsewhere. I have several times noticed specimens alight on old rail fences, and also on stumps in the edge of woods; these are variations from their usual habits. As to their flight, it is sometimes very irregular, continuing so for a considerable distance; and they even occasionally hover (just for a moment, apparently in uncertainty) preparatory to alighting. I have often observed quite long flights in this species, though generally not above a certain height. However, I noticed one which was unusually high. The specimen having flown up from the sand, rose higher and higher in the air, sailing continually from me, until I lost sight of it from the distance. It must have risen fifteen feet at the least, and continued sailing at this height (flight while rising also included) for sixty or seventy feet, and was still rising and sailing on when I could no longer distinguish it on account of the distance. This flight out-does all I have ever observed in this species. The wind probably aided it some, but there was only a moderate breeze at the time.

I witnessed some curious actions one day on the part of one of these tiger beetles. A male specimen rushed several times at a large wasp which was making a hole in the sand near by; and once it ran into the hole (which was in the side of a bank), but immediately reappeared, whereupon I captured it. The beetle was perhaps anxious to secure the egg, which it knew the wasp would deposit in the sand; or, still more likely, was in quest of the insect victims with which many of the Hymenoptera stock their nests.

I have often noticed specimens of this species, which are unable to fly, but are very active on their legs, running extremely fast and dodging

one's fingers repeatedly. They are of both sexes. Individuals occur which connect these runners with the flyers, inasmuch as they are able to make very short leaps while running, using the wings to assist them at these times. Of all of these specimens unable to fly that I have examined (and I have examined nearly all I came across), I have succeeded in finding alar defects in but one; in this one the marginal nervure of one of the wings was broken, where the wing folds to be laid under the elytron. In all the others the wings were to all appearances as well formed as in any specimens of the species. This peculiarity is no doubt due to a weakness of the muscles which control the wings, tending towards a form incapable of flight and in which the elytra are connate.

Specimens are often taken mutilated; and these, though in the majority of cases males, are quite often females. So it would appear that in this species the females have some fighting to do, as well as the males. In one instance I took a male which was lying on the sand right side up, apparently lifeless, but unmutilated; it had just enough life left to move its mandibles as I picked it up. Others are taken with their antennæ, legs or elytra injured, or even wholly wanting. I have taken one specimen which had lost both elytra. Mutilated ones seem to occur in the greatest proportion towards the last of the season, and then they are in general most badly mutilated. On 13th October, of the nine specimens taken, six were males, and all of these but one mutilated; one had its left elytron half nipped off, and the others a sad state of the legs, many being entirely gone. One of the females also had a leg missing.

I have observed a deformity in this species in a female taken with one elytron imperfectly developed, there being a wrinkle or plait taken across it near the extremity. This female was a small one, and in addition to the deformity had the tarsi of two of the legs missing.

It may be well to add what effect the cyanide of potassium has upon these beetles. They generally seem anxious to have something in their jaws when they die under the influence of this chemical. If they cannot get a leg or an antenna of some fellow beetle in their grasp, they will often die with one of their own legs clasped tightly in their mandibles. Several specimens were taken out after having been about forty-five minutes in the cyanide bottle. The only parts that showed life were the posterior tarsi; there was a frequent twitching of the final joints in these. After being out some time, some of the other tarsi were similarly affected, and probably the insects would have gradually recovered their full powers, had I not

replaced them in the bottle, where the action of the cyanide slowly extinguished the remaining sparks of life.

TABLE SHOWING THE PROPORTION OF THE SEXES IN CICINDELA VULGARIS, SAY.

Date of Capture.	*Whole No. Taken.*	*No. of ♂.*	*No. of ♀.*
* 19 March, 1882	5	1	4
† 28 " "			
22 August, 1883	6		
23 " "	4		
31 " "	54		
2 Sept. "	121		
3 " "	127		
19 Oct. "	25		
Date unknown	195		
	532	268	264
26 August, 1884	26	17	9
29 " "	132	72	60
30 " "	3	2	1
4 Sept. "	29	18	11
6 " "	255	124	131
8 " "	120	68	52
15 " "	1	1	
16 " "	73	44	29
17 " "	273	159	114
‡23 " "	6	2	4
25 " "	50	26	24
6 Oct. "	33	20	13
13 " "	9	6	3
25 " "	1	1	
Summary	1548	829	719

* Of 17 taken from their holes, all were females.

† Of all taken, both in holes and out, there were 45; 14 males and 31 females. In those that were out the two sexes were about equal in number. But all of the dozen or more taken in their holes were females.

‡ Were taken under rails on a sandy piece of plowed ground, the weather being cloudy and threatening rain.

FURTHER EXPERIMENTS UPON THE EFFECT OF COLD APPLIED TO THE CHRYSALIDS OF BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

In CAN. ENT., vii., p. 236-240, I gave an account of experiments with *P. Ajax*, placing the chrysalids on ice. In vol. ix., 4 and 203, of *Ajax*, *P. Tharos* and *L. Pseudargiolus*. In Psyche, iii., 6 and 15, these were all brought together, and additional observations on *G. Interrogationis* were given; also p. 174, on *L. Disippus*. In the case of the seasonally-dimorphic *Ajax*, the conclusion was reached, Psyche, iii., 18, that the longer the exposure the more decided the change, but changes had been produced at 11 to 30 days; at and under 8 days no change was perceptible. That 30° to 40° Far. seemed to be the proper temperature for the purpose. That the effect of the cold was to albinize the butterfly, the black area being constantly reduced.

That with *G. Interrogationis*, after the chrysalids had hardened, i. e., about 12 hours after pupation, 14 days exposure, temp. 35° to 45°, had been found sufficient to produce marked changes in coloration. That with different species the degree of temperature required to produce the most decided change varies; the experiments best succeeding with *P. Tharos* at 40°, *Ajax* 32° to 40°. At 32° had destroyed many Grapta *Interrogationis* chrysalids. The effect of the cold was to melanize the butterfly in certain parts of the fore wings.

In the case of *P. Tharos* a complete change of form was brought about, the butterflies which naturally would have come out the summer form, in every case coming out the winter form. Some chrysalids exposed before they had hardened, at 30 to 60 minutes after pupation, were not changed in form, but the colors had run, making what is called "suffused" specimens; but the butterflies from chrysalids which had been from 1 to 9 hours old, were completely changed. *Tharos* was the only species in which it did not seem necessary that the cold should be applied only after the chrysalis had hardened, in order to change the form. In other words, this species was very susceptible to change either of form or color, and at 32° to 40°.

This year, 1884, I have continued the experiments as follows, using same treatment.

1. MELITÆA HARRISII, Scud. In all cases the tin boxes containing the chrysalids were laid on the surface of the ice in ice-house, where the

temperature was found to be 32°. On 19th May, exposed one chrysalis (A) at 5 hours from pupation, and one (B) at 14 hours. These were left for 18 days, being taken off the ice 7th June. On 14th June emerged 1 ♂, 1 ♀, both suffused on under side of hind wings, and in same manner. The male came from the chrysalis B, exposed at 14 hours, and is very melanic on whole upper surface, the fulvous areas being restricted to narrow bands. In the female (A) exposed at 5 hours, the fulvous area is not different from that of some examples not exposed to cold. Both these, on under side, have the buff spots of discal band in the costal and subcostal interspaces lengthened so as to connect and become confluent with the buff marginal spots. In the male the two wings are not equally affected, the left wing having three of these spots confluent, the other only one completely, and one nearly. Another male (C) exposed at 18 hours old, and for 9 days, is melanized on upper side, but to a less extent than the male (A). On the under side of hind wing the buff spots are largely reduced in size, and often obliterated; of the 5 spots next base, 3 are represented only by black (that is, the buff has passed away), and the other 2 are reduced to less than half the usual size; the discal band is reduced to small, disconnected spots. In the normal examples this band is cut by two black lines running across the wing, leaving the middle section broad, and the two outer sections made up of small spots. There is a little irregularity in the course of these black lines, but the result is that on the 4 interspaces next costal margin there are 3 buff spots to each, 2 each to the next two interspaces, and 3 on the last interspace (or sub-median). In the example under view the whole of the anterior row of buff spots is wanting. In the normal example there is also a complete sub-marginal row of pretty large buff lunules; in this other all are wanting except two narrow crescents in the median interspaces and a streak in the discoidal interspace.

A ♀ (D) exposed at 24 hours, and for 9 days, is not changed on upper side, but on under hind wing the buff discal band is nearly obliterated, the whole of the inside (and longest) spots being lost. The spots about base are not changed, nor are the submarginal crescents. Another ♀ (E) exposed at 24 hours and for 9 days, is not changed on upper side, but on under hind wing the submarginal crescents are lost, excepting in the two median interspaces, and there they are reduced to narrow bars; all the buff of both wings is changed to yellow.

On 13th June, I placed 10 chrysalids on ice, at 6 to 24 hours old; on

14th, 7 more, from 15 to 24 hours old; on 17th, two at 12 and 24 hours, in all 19 chrysalids. These were left till July 13th, or from 26 to 30 days. But three survived the exposure, one of which (F) gave ♀ 23rd June (chrysalis on ice 26 days). This example was in some respects more changed than either of those before mentioned. One hind wing was smaller than the other, and was free from all fulvous above; the other had the fulvous restricted to a narrow band on disk, with a row of minute spots posterior to it; the fulvous on the disks of each fore wing was also reduced to a narrow band. Beneath, the colors of fore wings were all dull, the black changed to brown; the submarginal buff spots were much enlarged and extended quite across the wing; the smaller hind wing, which had lost color on upper side, had no fulvous or buff on the outer half, but the discal buff band was present, though greatly narrowed, and nearly obsolete. The other wing had the discal band narrowed but distinct, the spots which constitute it separated instead of confluent, and the small spots outside the black lines which cut this band are entirely wanting; but the two spots of this band next costa were lengthened and confluent with the submarginal buff spots; also the fulvous ocelli which go to make the third band from the margin are nearly obliterated. The other two butterflies which came from this lot of chrysalids, one at 28, one at 29 days, were both cripples, the wings twisted, but as they were expanded to nearly full size, it can be seen that they are greatly altered, the colors more or less suffused, and the markings indefinite. As I have indicated, 16 out of the 19 chrysalids of this lot were killed outright, and no doubt by the length of the exposure to so severe a degree of cold; two emerged cripples, and the other partly crippled, one wing being affected.

But several of the chrysalids experimented with were not affected, viz., 4 at 6 hours old, for 9 days, 1 at 6 hours old, for 10 days. These all gave butterflies in no way differing from those not iced.

Thus it appears that

1 chrysalis, 5 hours from pupation, exposed 18 days,
1 " 14 " " " " 18 "

were much changed, the fulvous area in one, A, restricted on upper side, and both have the colors considerably suffused on under side.

1 chrysalis, 18 hours old, exposed 9 days,
2 " 24 " " " 9 "

were much changed, but in a different way from those first mentioned,

chiefly by the restriction or obliteration of the buff bands and spots on under surface.

One chrysalis (F), 12 hours old, exposed 26 days, still more changed, and that on both surfaces, by restriction and obliteration of the fulvous on upper side, and the obliteration of both buff and fulvous on lower side, besides being partially crippled.

Two chrysalids exposed 28, 29 days, were changed in same manner as F, but were wholly crippled.

In all, I obtained 14 butterflies from these iced chrysalids, 8 of them changed materially, 6 not at all.

In all cases the emergence of the butterfly was retarded by the full period of the exposure to cold. The butterflies appeared at from 5 to 7 days after the chrysalids were removed from the ice. At same time others, not iced, were coming out at from 5 to 8 days, according as the weather was clear or otherwise. *Harrisii* is a single-brooded species, and therefore there could be no such change of form as was brought about in *Tharos;* any changes would be limited to color or shape of markings, and would not be uniform.

2. Melitæa Phaeton.—I had a large number of chrysalids from hibernating larvæ which I had raised the year before, and 39 of them were placed on ice (temp. 32°), at various periods from 2 to 34 hours after pupation, and exposed from 10 to 27 days. The emergence of the butterflies was in all cases retarded, so that the length of the chrysalis stage after removal from the ice was the same as after pupation normally. But no perceptible changes were made in color, nor were any chrysalids killed by the cold. I fully expected to see suffusion and other marked changes in this species. Beautiful variations occur in *Phaeton*, as in other Melitæas, in nature, and I cannot but think that another series of experiments, with perhaps a longer exposure to cold, might serve to produce similar variations in the house.

3. Melitæa Chalcedon. I had but one chrysalis, which came from a hibernating larva fed by me the previous year. This at 25 hours old was on ice 27 days. The imago died just when ready to emerge, and so far as could be discovered the colors were not affected. This species also is subject to sports, and suffused examples are to be found in nearly every collection of butterflies.

4. Grapta Comma. On 1st June I placed on ice 2 chrysalids less

than 1 hour old, and 2 at 6. They were removed 22nd June, and all were dead and shrivelled.

5. APATURA CLYTON. Similar exposure to that of *Comma*, but at 12 to 24 hours gave similar results, all being killed. I had reason to expect as much in the case of *Comma*, as I had in former years lost all or nearly all Grapta chrysalids which were exposed before they had fully hardened. But I thought I would try severe measures once more, relying on obtaining further larvæ of *Comma* for milder treatment. Unfortunately I could find no more larvæ. This species being seasonally-dimorphic, it would seem as if there should be a change of form under these experiments, if tried in a proper manner.

6. PAPILIO PHILENOR. Nine chrysalids, at 6 to 36 hours old, left for 23 days on ice, were all killed but one, which gave butterfly unchanged.

7. PAPILIO TROILUS. One chrysalis exposed 15 days gave butterfly unchanged.

8. LIMENITIS URSULA. I placed one chrysalis at 4 hours old on the ice and kept it there 13 days. From this came a large ♀ after 9 days, or at the period usual for this species. This shows some peculiarities which may or may not have been owing to the exposure. One cannot decide from a single example. The *Ursulas* taken in this region have the metallic spots and the metallic area on disk of hind wing either all green or all blue; and the discal area spoken of is separated from the submarginal green or blue spots by a pretty wide black space, forming a band from costal to anal margin. In this iced example the black band is narrowed to one half that of any other in my collection, and instead of being uninterrupted, it is crossed next costal margin by three of the discal spots (or in three interspaces), which become confluent with the submarginal spots. The spots and bands are green, except that on one wing the spaces on disk lying between the branches of the median nervure are purplish-blue. The same distinction holds on the under side.

9. LYCAENA PSEUDARGIOLUS. On ice 4 chrysalids, 24 hours old, and kept there 23 days. By oversight a nearly mature larva of same species had been shut in with the chrysalids, and had eaten into one of them. But the larva and the other chrysalids were dead.

THE CRANBERRY FRUIT WORM.* *(Acrobasis vaccinii.* N. sp.*)*

BY PROF. C. V. RILEY.

Acrobasis vaccinii, n. s.—General color and appearance of *A. indiginella* Zell. *(nebulo* Walsh) but a somewhat smaller species, with primaries usually narrower. It may be distinguished by the following differences as compared with *indiginella:*

Average expanse, 15 mm. Colors of a colder gray with less reddish-brown or tawny on the inner portions of primaries, and with the pale costal parts nearly pure white, so as to contrast more fully with the dark shades, and to more fully relieve the basal branch of the forked shade on inner part of first or basal line, this basal branch being also usually darker than the outer or posterior branch. The triangular costal patch from the basal line is obsolete. The transverse pale lines are less clearly defined and the terminal is nearer the posterior border of the wing, *i. e.*, the median field is wider. The geminate discal dots are always well separated and the inner one well relieved by the white which extends around it on the darker ground and often forms an annulus. The oblique shade from apex is less clearly defined.

Described from 16 specimens of both sexes, reared from cranberries.

EGG.—About 0.4 mm. long, and 0.3 mm. broad; ovate or almost circular, and flattened or plano-convex, the form varying with the surface of attachment to which, while plastic, it partly conforms. Color, olive-green or brown.

LARVA.—Average length when full grown 10 mm. Convex above, flattened beneath. Surface of body minutely granulate with a dull, somewhat greasy appearance. Color varying from greenish-yellow to olive-green, reddish or brownish, being generally darkest towards the anal end. Head yellow, polished, somewhat lighter towards the mouth, with the sutures of the clypeus slightly brown, and the anterior angles of the head distinctly so; labrum, antennae and palpi white; mandibles yellowish at base, becoming blackish toward tip; ocelli black. Cervical shield somewhat paler than the head, almost colorless anteriorly, its median line scarcely paler, without any markings, except a brownish or blackish wart a little in front, above the stigma. Anal plate of same color. Stigmata extremely small, except first and last pair, oval and pale brown. Pili-

* From advance copy from the forthcoming Annual Report of the U. S. Entomologist.

ferous warts only about half the size of stigmata, very pale brown and polished, each supporting a fine hair of a faintly yellowish color, of which those on the posterior row of warts are much the longest and are directed forward. Similar long hairs are also on the head, thorax, around the margin of the anal plate and along the sides of the body. Legs concolorous with body.

PUPA.—Average length 7 mm. Brownish-yellow. Stigmata brown. A dorsal, dark brown, transverse band, anteriorly on last joint. Tip broad, almost straight, having a small tooth at each angle, and along its inferior edge four fine yellowish-brown bristles, twisted and directed forward. Abdomen shallowly punctate.

In the series of American Phycids, this species naturally follows *indiginella*, and it is at once distinguished from this, from *juglandis* LeBaron, and from *fallouella* Ragonot—its nearest European ally—by the obsolescence of the triangular costal patch.

Mr. Grote in his last "Check list of N. A. Moths," has suppressed *Acrobasis* Zeller, and referred this little group of Phycids to "*Phycis* Haw." He has also made *juglandis* a variety of *indiginella*. These changes I regard as unjustifiable. *Phycis* as a genus was founded by Fabricius, and Haworth's *Phycis* comprised nearly all the species of the family, and the name has long been abandoned in modern more exact classifications; while the full descriptions, figures and larval histories of *indiginella* and *juglandis* in my 4th Rep. on the Insects of Mo. (pp. 38-43) prove beyond all question the specific value of both.

There is a *Nephopteryx vacciniella* Zeller or *Vaccinium uliginosum* in Europe, and for this reason I have dropped the conventional termination in the name of our species.

NOTE ON INEQUALITY OF THE ELYTRA IN ALAUS OCULATUS.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

On 19th October, 1884, I took from a decaying hickory stump a specimen of *Alaus oculatus* (Linn.), which had its left elytron .75 mm. shorter than its right. This seemed to me a curious and very noticeable deformity, and one I had never before observed. But on 13th December

ensuing I discovered that a fine, robust specimen which I had taken from decaying hickory the day previous had its left elytron .25 mm. shorter than its right, this time the difference being much less, but still noticeable. I then examined fifteen other specimens of this species in my collection, with the following result: One with left elytron .25 mm. shorter than right; one with left .20 mm. shorter than right; one with left shorter than right, but the difference hardly appreciable; one (small specimen) with right .20 mm. shorter than left; and one in which the right was so slightly less than the left that the difference could scarcely be seen. The remaining ten showed no appreciable differences in this respect. So of seventeen specimens examined, seven had the elytra unequal in length in a considerable degree, one being especially prominent thereby. And it is noticeable that in five of the seven specimens it was the left elytron that was the shorter, these also being the cases in which the inequality was most prominent. I believe all of my specimens, with one exception, were taken from their cells in the wood, as they are found after having assumed the imago. I have no doubt that if others would examine the specimens of this species in their collections, many more such examples would be found which have been overlooked. It would be interesting to know the result of such examinations. It is probable that the elytra, being organs not of strictly primary value to the insect—elytral invariability in this direction not being absolutely essential when within certain limits—have thus been permitted to vary without the variations being struck out by natural selection. I have not observed this elytral inequality in any other Coleoptera as yet.

A form of this species, which is less robust, I occasionally find; it is slightly narrower in proportion and more delicately marked, but upon sending specimens of the two to Dr. Horn, he informs me that they do not differ appreciably, but are both *oculatus*.

CORRESPONDENCE.

NOTE ON THE HABITAT OF XYLORYCTES SATYRUS.

Dear Sir: Mr. W. F. Robinson, of Bridgeton, N. J., sent, Oct. 28, 1884, a specimen of this beetle, with the remark that it is being dug up around the roots of trees there in abundance by his school boys. The collections here contain it not farther to the north than Pennsylvania. Not

being able to find it recorded from N. J., or farther to the north, I should like to hear if its occurrence north of Pa. is known. I may add that Mr. Robinson gave to the collection a very small specimen of *Strategus antaeus* collected by him in Nantucket, Mass., Aug. 24, 1884.

DR. H. A. HAGEN, Cambridge, Mass.

Dear Sir: In reference to your article in the August number, allow me to add as injured by *Pulvinaria innumerabilis*, the following: No. 1, *Acer saccharinum;* 2, *A. rubrum;* 3, *Negundo aceroides;* 4, *Ulmus fulva;* 5, *U. americana,* 6, *Celtis occidentalis;* 7, *Morus rubra;* 8, *Fraxinus sambucifolia;* 9, *Populus balsamifera;* 10, *Juglans cinerea;* 11, *J. nigra;* 12, *Rhus toxicodendron. Tilia americana* I have not seen affected here; our cultivated grape *(Vitis)* very seldom, and sparsely, if at all, while our wild grape seems perfectly free from the pest. This insect, better known here as the Maple-slug, has been found by me on all the above, never taking note unless I found it at least six times on the same kind of trees, growing far apart and in quantities as follows: On No. 1, sparsely; 2, soft maple, very full; 3, ash-leaved maple, better known as box-elder, very full, equal to No. 2; 4, 5 and 6 less affected but alike; 7, 8 and 9 sparsely; 10 and 11 least affected, while 12 (being our poison ivy) only when the tree to which this parasitic plant was attached was affected. I had made my observations in Peoria, Tazwell and Livingston Counties, and have noticed in the City of Peoria especially the stone pavements sprinkled with the so-called honey dew in patches here and there, so thick that any passer-by would look up wonderingly unless familiar with the cause. As such articles are of interest to farmers and to growers of shade trees, they will be glad to get such information as experience can give them through some observation. The last visit of this insect in great numbers was about five or six years ago. The question here has frequently been asked with some anxiety: How will they appear next season, etc.? Their natural enemies and wet weather, especially when the rains come frequently during hatching, as well as other causes, are among the agencies which limit their increase.

A. H. MUNDT, Fairbury, Ills.

August No. Mailed Nov. 17, 1884.
Sept. " " Dec. 1, "
Oct. " " " 17, "
Nov. " " " 24, "

INDEX TO VOLUME XVI.

ERRATA.

Page 227—8 lines from top, for "unipuncta" read "unipunctata."
" 213—11 lines from bottom, also 3 lines from bottom, for "J. W. Fyles" read "T. W. Fyles."
" 214—10 lines from bottom, for "fungus" read "fungous."
" 214—4 lines from bottom, for "ovæ" read "ova," and for "Tachnia" read "Tachina."
" 214—5 lines from top, for "Smyth" read "Smith."
" 214—2 lines from bottom, for "Homopteron" read "Hemipteron."
" 217—16 lines from top, for "Nepigon" read "Nipigon."
" 217—2 lines from bottom, for "nigricornis" read "nigrirostris."
" 218—12 lines from bottom, for "Vespa?" read "Vespa—?"
" 218—10 lines from bottom, for "Pieris" read "Pamphila."
" 218—9 lines from bottom, for "P. centaurea" read "Pyrgus centaurea."
" 219—2 lines from top, for "A. Macoun" read "W. Macoun," and for "Nepigon" read "Nipigon."
" 219—7 lines from top, for "Ptinidæ" read "Ptinus."
" 219—22 lines and 12 lines from bottom, for "S. W. Taylor" read "G. W. Taylor."

THE CANADIAN

ENTOMOLOGIST.

VOLUME XVII.

Edited by William Saunders,
LONDON, ONTARIO.

ASSISTED BY

Rev. C. J. S. Bethune, M. A., Port Hope, Ont.; E. B. Reed, London, Ont., and C. J. Bowles, Montreal, Que.

London:
PRINTED BY THE FREE PRESS PRINTING COMPANY.
1885.

LIST OF CONTRIBUTORS TO THIS VOLUME.

BEAN, THOS. E.....GALENA, ILL.
BELL, J. T.....BELLEVILLE, ONT.
BLANCHARD, F.....LOWELL, MASS.
BOWLES, G. J.....MONTREAL, QUE.
BRODIE, W.....TORONTO, ONT.
BRUNER, LAWRENCE.....WEST POINT, NEBRASKA.
CAULFIELD, F. B.....MONTREAL, QUE.
CLARKSON, F.....NEW YORK CITY.
CLAYPOLE, E. W.....AKRON, OHIO.
DAVIS, WM. T.....TOMKINSVILLE, STATEN ISLAND.
DIMMOCK, GEORGE.....CAMBRIDGE, MASS.
EDWARDS, HENRY.....NEW YORK CITY.
EDWARDS, WM. H.....COALBURGH, W. VA.
FERNALD, C. H.....ORONO, MAINE.
FISCHER, PH.....BUFFALO, N. Y.
FLETCHER, J.....OTTAWA, ONT.
FRENCH, G. H.....CARBONDALE, ILLS.
GEDDES, GAMBLE.....TORONTO, ONT.
GOODHUE, C. F.....WEBSTER, N. H.
GROTE, AUG. R.....BREMEN, GERMANY.
HAGEN, DR. H. A.....CAMBRIDGE, MASS.
HAMILTON, DR. J.....ALLEGHENY, PA.
HARRINGTON, W. H.....OTTAWA, ONT.
HENSHAW, SAMUEL.....BOSTON, MASS.
HORN, DR. GEO. H.....PHILADELPHIA, PA.
JACK, J. G.....CHATEAUGUAY BASIN, QUE.
KEEN, EUGENE L.....PHILADELPHIA, PA.
KELLICOTT, D. S.....BUFFALO, N. Y.
KILMAN, A. H.....RIDGEWAY, ONT.
MOFFAT, J. ALSTON.....HAMILTON, ONT.
PROVANCHER, L.....CAP ROUGE, QUE.
REED, E. BAYNES.....LONDON, ONT.
SAUNDERS, WM. (The Editor).....LONDON, ONT.
SMITH, JOHN B.....WASHINGTON, D. C.
TAYLOR, GEO. W.....VICTORIA, BRITISH COLUMBIA.
TOWNSEND, C. H. T.....CONSTANTINE, MICH.
UNDERWOOD, LUCIEN M.....SYRACUSE, N. Y.
VAN DUZER, E P.....LANCASTER, N. Y.
WILLISTON, S. W.....NEW HAVEN, CONN.
WINTLE, ERNEST D.....MONTREAL, P. Q.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., JANUARY, 1885. No. 1

ENTOMOLOGY FOR BEGINNERS.

THE RASPBERRY SAW-FLY.

Selandria rubi Harris.

BY THE EDITOR.

This destructive insect appeared in great force during the past season in many parts of our Province, doing much damage to the foliage of raspberry plants. Although in form and habits the larva of this insect much resembles the currant worm, it is not nearly so well known, nor is it usually so promptly recognized. There are several reasons for this. The raspberry saw-fly does not appear in such flocks as the currant worm, because the eggs are laid singly and not often near together; nor is the larva easily detected owing to the fact that in color it so exactly resembles that of the leaf on which it feeds.

The eggs are oval, yellowish white and semi-transparent, and are buried beneath the skin of the raspberry leaf near the ribs and veins, placed there by means of the saw-like apparatus situated at the extremity of the body of the female, by which slits are cut in the tissues of the leaf. The skin covering the egg is so transparent that the movements of the enclosed larva may be observed several days before it is hatched. It escapes through an irregular hole made on one side of the egg.

The newly-hatched larva is about one-twelfth of an inch long, with a greenish-white head having a black eye-like spot on each side. The body is nearly white, semi-transparent and thickly covered with transverse rows of white spines. As it grows older the color changes to green, and when full grown it measures about three-quarters of an inch in length and appears as shown on the leaf in figure 1. The body then is of a dark green color, and is thickly set with pale green branching spines. In figure 1 some of the segments of the body are represented, magnified, showing the arrangement of the spines on the back and side. The head is small, of a pale yellowish green color, with a dark brown dot on each

side. The eggs are laid near the tips of the growing canes, and the larvæ are usually found feeding on the upper surface of the young leaves. When full grown, which is generally from the middle to the end of June, the larva leaves the bush and descends to the ground, where it penetrates beneath the surface and constructs a small oval earthy cocoon mixed with silky and glutinous material. The larva remains unchanged within the cocoon for a considerable period, but finally transforms to a chrysalis from which the perfect insect is produced the following season.

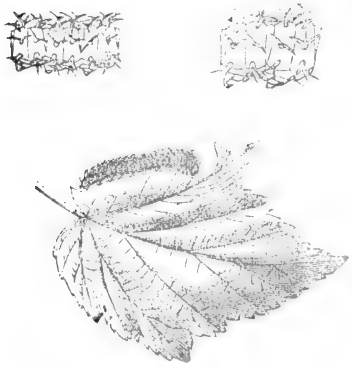


Fig. 1.

This is a four-winged fly, shown magnified in figure 2, which appears from about the tenth of May to the beginning of June, or soon after the young leaves of the raspberry begin to appear. The wings, which are transparent with a glossy surface and metallic hue, measure when expanded about half an inch across; the veins are black and there is a streak of black along the front margin, extending more than half way towards the tip of the wing. The anterior part of the body is black, the abdomen of a dark reddish hue. Early in the morning when the air is cool these flies, when approached, will fall from the bushes to the ground and remain inactive there long enough to admit of many of them being caught and destroyed, but as the heat of the day increases they become much quicker in their movements, and when disturbed take wing readily.

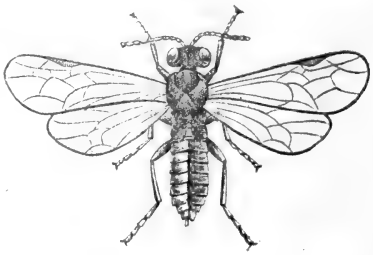


Fig. 2.

The larvæ may be promptly destroyed by syringing the bushes with water in which powdered hellebore has been mixed in the proportion of an ounce of the powder to a pailful of water, or with Paris green and water in the proportion of a teaspoonful of the poison to a pailful of water.

SPECIES, VARIETIES AND RACES.*

BY JOHN B. SMITH, BROOKLYN, N. Y.

At the recent meeting of the Entomological Club of the A. A. A. S., Dr. Horn found occasion to say that "nature has no genera, but species only"—genera are mere artificial aids to classification, are seldom sharply defined, and are of very unequal value, according as the student is inclined to value characters; nor are the same characters useful in all the orders, nor indeed in the several families in the same order.

The important part of Dr. Horn's remarks, for the present purpose, is the assertion that "nature has no genera." That Dr. Horn has an experience in American Coleoptera large enough to render such an observation from him of great weight, no one will dispute, and taking the Lepidoptera into consideration I am led by my studies to agree with him thoroughly.

Afterward, at the same meeting, Prof. Fernald, than whom we have no better authority on Micro-lepidoptera, stated that he was greatly interested in Dr. Horn's view of genera, but for his part he would be well content to have a satisfactory limit to species.

What is a species? The question has oft been asked, and never satisfactorily answered. Dr. LeConte long since stated in reply to that question, "Alas! we do not know." Elsewhere he defines it as "an assemblage of individuals which differ from each other by very small or trifling and inconstant characters, of much less value than those in which they differ from other assemblages of individuals; but who determines the value of these characters? The experienced student of that department to which the object belongs; therefore groups of individuals which are recognized as such by those who from natural power and education are best qualified to judge."

This, therefore, does not quite answer the question, but leaves an element of opinion in the matter.

Not long since, Mr. W. H. Edwards, in an article on the species of *Papilio*, says: "I hold that every permanent form possessed of marked characters which distinguish it from other forms, and which breeds true to its type, so far as appears or we can know, is to be regarded as a species,

*Read before the Brooklyn Entomological Society, Nov. 29, 1884.

at least till the contrary is proved. And the proof must be actual, not imaginary, facts, not guess work."

Mr. Edwards' definition is very good, but it leaves open the question, What is a "marked character"? That this is a question of opinion will hardly be disputed, and we are thus left as far as ever from a definite reply to our question. I shall not attempt to offer any new definition of a species; but shall in the present essay confine myself to a few instances tending to show that the breeding true to itself is no test of a species, and further that characters to separate species must be sought in other points than color and maculation.

In the Coleoptera no family offers better examples than the Cicindelidæ, and from this family my instances shall be drawn.

The variations of *Cic. 6-guttata* have been recently noted in the CANADIAN ENTOMOLOGIST. My own series of the species consists of 31 specimens, ranging from the immaculate form, blue and green in color, to the *patruele* form with complete median fascia, humeral and sub-humeral spots. The variation in this species is very wide, and is found everywhere, except that the *patruele* form is not found eastward.

A more interesting species is *scutellaris*, of which my series comprises 35 specimens.

In the far west—Kansas, Ind. Terr. and thereabouts—we find the type form of a beautiful metallic red bronze, the scutellar space green, maculation indistinct. It is the only form found in the far west, and is perfectly separable from the following.

In the Eastern States (N. Y., R. I., Md. and Mass., according to my collection) we find a form with similar markings, which are, however, much more distinct, but the ground color is a sordid green. This form is also perfectly distinct from any other, and is recognizable at a glance. With similar markings we find an insect locally in N. J. and Pa., which, however, has the ground color black. It is taken year after year in a small spot near Jersey City, and never shows any approach to the preceding or following. It breeds absolutely true to itself; none of the other forms are taken where it flies. In Northern N. Y., Mass. and Can. we find the same form as to markings, but the ground color brown red with the maculation often connected at margin.

In the Southern States we find the same form green or blue without markings, and in Georgia and perhaps in Va. we find an insect obviously the same, but entirely black. We have therefore a range of color variation

from dead black to bright brown red, to bright green and to metallic bronze red. In maculation from no markings at all to a pale margin to elytra, apical and humeral lunule and marginal spots. The interesting point in these variations is that they are local, that they breed absolutely true to themselves, that they are permanent, possessed of marked characteristics, and are yet merely *races* of one species. Of *Cic. purpurea* I have a series of 46 specimens varying from immaculate bronze red to bright bluish *green;* in maculation from an indistinct median streak to a broad deflexed band, broad apical and humeral lunules, and pale outer margin connecting all markings. The variation is wonderful, and it is not so only in color and maculation, but also in size, and to a less extent in form, *decem-notata* being much more slender than the normal form. These, while much less sharply distinct than in the forms of *scutellaris*, are yet largely local, and the local forms in many of the instances breed absolutely true to themselves. The difference between my specimen from Nevada, which is very large and entirely green, and the common Eastern form, is immense, and as great as there is between any two species of the genus.

C. formosa is in the West bright metallic red, while in the East it is obscure slate gray, though often with an obvious reddish sheen. These forms breed absolutely true to themselves, and are possessed of marked characters separating them. Yet they are certainly the same. These examples in the Cicindelidæ are not isolated, and indeed it may be said that most of the more widely distributed forms show analogous variations; the variations being important from my point of view by the fact that they are permanent, distinctive, and local.

Thus far as to variations in color. In sculpture there is also a difference, less local, however, the elytra being foveate or not in one and the same form *(abdominalis)*, and sometimes almost smooth and distinctly punctured *(Pilatei)*.

In sculpture the Carabidæ show more variation, and while my own collection does not show it, Mr. Ulke called my attention to his series, showing an astonishing range of variation in the sculpture of elytra of the same form, and these variations were all more or less local.

Other structural characters vary, and often locally, but need not be especially noted here, the variation in number of the antennal joints in *Prionus* being cited as curious rather than important to our present purpose.

What I have endeavored to show here is a great variability in color and maculation; local constancy of color and maculation, and that the local forms often breed absolutely true to themselves, and come fully within Mr. Edwards' definition of a species.

In the Lepidoptera we find variations equally great. The species of *Satyrus* may serve as an example. Taking the two forms named, *nephele* and *alope* alone, and excluding *pegala*, which really in my opinion belongs with them, we have here two forms, to each of which in most localities Mr. Edwards' definition of a species will perfectly apply.

In my paper on the genus *Satyrus* I have recorded the variations of the species, local and otherwise, and my conclusion on a re-examination of further material is confirmed, showing that in the genus *Satyrus* maculation, so far as any exists, is absolutely valueless for specific separation; and further, though it is possible, of course, to separate the forms, I believe there is no distinct line of demarcation between most of the "species" even recognized in that paper.

In *Chionobas* and *Cœnonympha* we have analogous variation, also largely local; but the material in these genera is not yet sufficiently large to allow a final conclusion. In the Noctuidæ very similar variations occur. In the East, *Agrotis lubricans* is one of our most constant forms and has a handsome reddish suffusion over the primaries. In Kans. and N. M. is found a form apparently bearing no relation to it; but yet when closely examined proving identical with our Eastern forms, except that the red shade is replaced by blackish. This Western form Mr. Grote named *beata*. In Texas the examples taken are intermediate between the extremes of Eastern and Western types, and as properly referred to one as the other.

The variations of *Agrotis declarata* Wlk. (*campestris* Grt., *decolor* Morr., and *verticalis* Gu.) further illustrate the same local tendencies. This, in the East, is dark in ground color; westerly the thorax and basal space become rust red, and in some localities the only form found has a lilac gray ground color. Now it is scarcely conceivable that with the same amount of material to work with, any one could come to a different conclusion, yet at least two of the forms are good species under Mr. Edwards' definition. Other species show equally striking variations, and yet are undoubtedly alike.

I have cited but a few instances of variation, where the variations are

to an extent constant and local; many more could be cited, but these are sufficient to show—

First, that ground color cannot be exclusively relied upon as specific distinction, either in Coleoptera or Lepidoptera.

Second, that maculation, except where it completely changes a pattern, is not in itself a specific character.

Third, that species which are widely distributed vary, and the variations are often local, and constant.

In reference to this last proposition, it is a recognized fact that in Coleoptera the most common and widely distributed species show the greatest variations. *Pterostichus lucublandus* may be cited as an instance. That the Atlantic coast fauna is very widely distributed, many species ranging from Maine to Texas, and westward beyond the Mississippi. That further west the faunal character changes. The Heteromerous type becomes most prominent; often apterous and usually slow in motion, and living in crevices, the species do not travel much, and well marked forms are often locally common, but not elsewhere found. In the great canons and valleys of the Rocky Mts. and the Sierras, nearly each has its own peculiar fauna, poor in species, but rich in examples, and owing to the natural barriers to the habits of the predominant types, species become fixed, local, and very constant, showing little or no variation.

To the Lepidoptera these natural obstacles do not form as complete a barrier, because of their powers of flight; still we find a tendency to local variation. The *Agrotes* afford good examples of that.

Now in an admitted case like the variation of *Cic. scutellaris* and *Satyrus nephele*, by what term shall we designate these forms? Not as species, for they differ only in characters which are inconstant, yet the characters are locally permanent. Sub-species conveys an indefinite and inaccurate idea; variety is applied also to forms which occur mingled with the type form, and not exclusively applicable to such local forms as I have cited.

An analogous case exists with the highest of beings—man. The best authorities agree in saying that notwithstanding the immense structural differences between them, there is yet but one species of *Homo*. The various forms are termed *races*. Why not apply the same terms to such forms as *nephele* and *alope*? They are admittedly one species, and yet locally breed perfectly true to themselves, and except in localities where they intergrade, they are easily distinguished. *Pegale* occupies a similar

position, and so do some of the western forms. All these, as is also the case in the Cicindelidæ cited, are offshoots from the same stock which have varied gradually as they spread over a larger territory, and became gradually local and fixed, but yet show their relationship by their identity of structure.

Satyrus shows no structural differences except a slight one in wing form, separating what I term group *alope* and group *silvestris*. All the species of each group show their intimate relationship.

To Coleopterists I need hardly speak. Dr. Horn takes every opportunity of saying that color and maculation do not alone suffice for specific separation; only structural characters should be recognized.

Lepidopterists have not yet come to that conclusion. Not only is structure not regarded in the question of a new species, but characters are used—color differences—which are known to vary in allied species. Take the species of *Argynnis*, for instance: What are they based upon? Slight variations in maculation, which an examination of a large series of *cybele*, *aphrodite* or *atlantis*, show to be inconstant.

Yet structural characters are by no means wanting in the Lepidoptera. Of over 200 species of *Agrotis* examined by me, two-thirds show obvious differences in structure, and the others differ in other obvious characters exclusive of color.

Of the species of *Mamestra* thus far examined by me, no two agree entirely in structure; and indeed throughout the Noctuidæ good species are very generally separated by distinctive structural peculiarities. That the Diurnals and Bombycidæ show similar variations is almost certain, and as soon as students in these groups will cease to rely upon minute differences in color and maculation, but will accept the facts that western species vary quite as much and perhaps more than eastern species, then will it be possible so to describe a species that it can be recognized.

The tendency of all species is to vary in color and maculation, and the variations also tend to become locally permanent; still these local forms cannot yet be regarded as anything but races—certainly not species, and it is not only confusing, but discouraging, to see a series of *Colias*, *Argynnis* or *Satyrus* all named as species, differing by such trivial characters that one dares not remove a label or change the position of an insect for fear that the species could not be again recognized.

It is thoroughly illogical at all events for a student to accept the theory of evolution, which necessarily precludes the idea of fixedness in species,

and then to make the slightest and most trivial character serve as a basis for a new species, even when it is known that the character is elsewhere in the genus a known variable one.

In my *Satyrus* paper I termed "forms" what I here term "races." The latter is more expressive and more in accordance with the nomenclature in other departments of zoology.

CONTRIBUTIONS TO THE NORTH TRANS-CONTINENTAL SURVEY.

BY LAWRENCE BRUNER, WEST POINT, NEBRASKA.

ORTHOPTERA.

Herewith is presented for publication a partial list of the Orthoptera collected by Dr. H. A. Hagen and Samuel Henshaw during the summer of 1882, along the line of the Northern Pacific Railway. The collection, although not an extensive one, contains some new forms, as well as several interesting varieties of well known species. The collection is also of much interest in extending the range of quite a number of species heretofore recorded as occurring only on the eastern slope of the continental divide, or at the extreme eastern edge of the great interior basin, to the western slope.

Taken as a whole, this collection of Orthoptera is very complete for the regions in which it was made, and shows careful work both in its formation and preservation. It is to be regretted, however, that so few specimens of some of the more interesting forms were taken, a feature which, no doubt, might have been remedied to some extent had their value been known at the proper time.

There still remain a few species which are to be more carefully studied and compared before they can be properly placed. These, when I have the time to do so, will be worked up, and, in connection with the doubtful ones here enumerated, will form the subject for a future paper, when, it is hoped, I will be able to add such points as have been carelessly overlooked here.

ACRIDIDÆ.

Stenobothrus æqualis Scudd. Quite a large series of what appears to be this insect were taken July 16, at Yakima River. The specimens differ from eastern ones in several respects, but not enough to warrant describing them as new. The occiput is a trifle longer than usual, and the middle row of spots on the tegmina extends almost to the tip. There are males and females of both greenish and brownish-gray colors.

Stenobothrus coloradus Thos. A few examples of the ordinary form on Yakima River, July 16.

Stenobothrus curtipennis Scudd. This trim little species is represented by quite a large number of specimens, among which at least three well marked varieties occur. They were taken at various points along the Yakima River in July.

Stenobothrus sp.? A single specimen of a species resembling *S. brunneus*. and perhaps that species, but so badly damaged that it is difficult to place it with a certainty. Same locality as the preceding.

Chloealtis abdominalis? Thos. The collection contains a single male which is doubtfully referred to this species. Locality not noted.

Aulocara elliottii Thos. This species was numerous at Yakima and Ellensburg, as well as at many other points in eastern W. T. Among the specimens examined I find two well marked varieties which agree with Mr. Scudder's description of *A. cæruleipes* sufficiently close to be referred to that species, which is a synonym of *Stauronotus elliottii* Thos.

Dissosteira carolina Linn. Three specimens of this wide-spread species were taken at Portland, Oregon.

Circotettix undulatus Thos. A few at Yakima, July 16.

Circotettix carlingianus Thos. Same locality as the preceding.

Trimerotropis suffusa Scudd. A few specimens from some point in Washington Ter. which I neglected to note when they were examined.

Trimerotropis vinculata Scudd. W. T.

Trimerotropis pseudofasciata Scudd. A single male from some point in eastern W. T. This species was found by me on Birch Cr. in central Idaho, where it was quite common during July and August, 1883.

Trimerotropis cæruleipennis, n. sp.

Distinct from all other North American species with which I am acquainted in the coloring of the wings.

Wings without the median dusky band, faint cœrulean blue at the

base. Tegmina with the dusky markings not forming definite bands as a rule.

Vertex between the eyes rather broad, bounded by a sharp wall, with a well defined carina running longitudinally through the middle; frontal costa moderately prominent, contracted a little at its upper end and at the ocellus, widening below; sulcate throughout, deepest at the ocellus, the bounding walls or carinæ sharp, reaching the clypeus. Antennæ normal. Pronotum with the anterior lobes a trifle more contracted above than usual, the median carina distinct throughout, considerably elevated on the anterior lobes where the disk is much swelled and tuberculate. Tegmina rather narrow, extending beyond the abdomen one third their length. Posterior femora reaching the tip of the abdomen.

The general color is a dirty grayish yellow or yellowish brown, profusely flecked with irregular brownish dots. Face and sides of pronotum, with the anterior and middle legs, dirty whitish gray, densely flecked with various shades of brown; there are a few black dots and dashes along the carinæ of the face, pronotum and posterior femora. Antennæ annulated with alternate rings of testaceous and obscure brown. Tegmina cinereous brown on the basal two-thirds, transparent on the apical third, flecked with numerous small, quadrate, obscure brown spots, which, in some specimens, are pretty evenly distributed over the wing, while in others they are gathered into three irregular bands, the basal one occupying the basal third, the middle one the centre, and the other the apical third of the wing; beyond this the principal veins are brown, while there are also a few of the quadrate spots scattered at random. Wings beautiful sky-blue at base, gradually fading toward the middle, where the colored portion terminates. At this point and where the fuliginous band usually occurs, the nerves and nervures are dark, but otherwise there is no indication of a dusky band. Beyond this the wings are perfectly transparent, with nerves and nervures near the apex dusky. The upper portion of the thoracic and basal abdominal segments is tinged with a faint bluish color. Posterior femora with two dusky spots on the upper edge which are continued as black bands on the inner face, where the apex is also black; posterior tibiæ glaucous, with the inner base black, followed below by a rather wide yellowish white annulus, spines black-tipped; tarsi bright yellowish white. Lower surface dirty whitish.

Length of body, ♂ 20 m.m., ♀ 28 m.m.; of antennæ, ♂ 7·5 m.m.;

♀ 9.5 m.m.; of tegmina, ♂ 22 m.m., ♀ 31 m.m.; of hind femora, ♂ 10 m.m.; ♀ 15 m.m.

Specimens from Umatilla and Yakima, June 26-July 10. There are also specimens of this insect in the U. S. National Museum at Washington, from Montana, Idaho and Wyoming, and I have seen others that were taken in Utah.

Psinidia sulcifrons Scudd. A pair of what I take to be this species from a point in eastern W. T.

Psinidia wallula Scudd. Specimens taken July 18, at Lone Tree, Yakima River, and others at various localities in eastern Washington Terr.

Camnula pellucida Scudd. The collection contains quite a large series of this destructive locust, obtained at various points in Washington Territory during the month of July. Most of the specimens examined are of a rather darker color than usual in Pacific Coast representatives of this species.

Arphia tenebrosa Scudd. Quite a large series of specimens from La Chapples, on the Yakima River. These are of the variety described by Stal as *A. sanguinaria* in his Orthoptera Recentia.

Hippiscus montanus Thos. A few specimens taken at Camp Umatilla, W. T., June 27.

Hippiscus lineatus Scudd. Colville, W. T., July 24.

Hippiscus lineatus (?) Scudd. Var. The collection contains a few specimens of an insect agreeing with this species in all other respects, save the humeral vitta of the tegmina, which are wanting in these. The tegmina are also more equally flecked with small dusky spots than in typical specimens. Taken July 4-16 at various points along the Yakima River.

Hippiscus Haldemannii Scudd.? Several specimens doubtfully referred here, but do not know just where taken.

Hippiscus corallipes Hald. Several specimens which appear to belong here.

Pezotettix borckii Stal. The collection contains a single female which I refer to this species, from a point in eastern W. T.

Pezotettix hispidus, n. sp.

Without tegmina or wings. Body robust, glabrous, striped with yellow and piceous; posterior femora reaching beyond the extremity of the abdomen in both sexes. Hispid throughout.

Vertex between the eyes moderately broad, depressed, broadly and quite deeply sulcate, the sulcus broadening gently anteriorly where it is open, with a faint longitudinal carina through the centre ; the lateral walls prominent, rather broadly and roundly angled, highest just above the upper canthus of the eyes ; fastigium coarsely punctate. Frontal costa prominent, nearly equal, as broad as the front edge of the fastigial sulcus ; deeply sulcate throughout. Lateral carinæ diverging, reaching the lower corners of the face. Lateral ocelli very prominent, larger than the ocellus of the frontal costa, of a bright amber color. Antennæ as long as the head and thorax combined, the basal joint large, as wide as long, second joint pyriform. Eyes of moderate size, rather prominent, nearly globular (male), or with the front edge almost straight (female). Pronotum equal in the male, expanding posteriorly in the female ; median carina slight but visible throughout, most prominent in the female, lateral carinæ obsolete ; front margin straight, posterior margin slightly truncate, posterior lower angle nearly a right angle. Meso- and metanotum not differing on the dorsum from the basal abdominal segments. Abdomen tapering evenly and gradually posteriorly, sharply carinated ; last segment in the female greatly contracted, valves of the ovipositor exserted, reminding one of the structure of these parts in *Tettigidea ;* male abdomen with the last ventral segment pointed, the apex squarely docked and slightly but roundly notched. Supra-anal plate a little longer than broad, somewhat triangular, the posterior margin gently rounded, the apex slightly produced. Anal cerci cylindro-conical, directed upward and a very little backward, the extreme tip slightly contracted to a rather sharp point. Female cerci cuneiform, directed backward. Posterior femora moderately robust, but not greatly thickened at the base, with all the carinæ prominent and sharp, extending beyond the abdomen in both sexes. Posterior tibiæ normal ; tarsi with the first and third joints equal.

General color brownish piceous above, yellowish beneath. Face, lower half of the deflected lobes of the pronotum, and under surface of the body, with the anterior and middle legs ochraceous (female) or citrinous (male). Antennæ fuscous. A bright yellow line commencing on the lateral margins of the fastigial sulcus and extending backward on each side of the occiput across the pronotum at the outer edges of its disk to the tip of the abdomen, enclosing along the middle a line of the brownish piceous. Below these, on the sides, a broad stripe of the upper surface color, extending from the hind margin of the eyes to the tip of the abdo-

men, separating the dorsal yellow stripes from the yellowish under surface, enclosing on the meso- and metapleura a bright yellow patch and oblique line. Posterior femora with the disk and upper edge brownish yellow or yellowish fuscous, inner side with lower sulcus bright red; upper surface with very faint indications of the usual dark bands. Posterior tibiæ yellowish brown, becoming paler apically, a broad yellowish annulation near the base, spines black tipped.

Length of body, ♂ 18.5 m.m., ♀ 21 m.m.; of antennæ, ♂ 9.25 m.m., ♀ 10 m.m.; of pronotum, ♂ 3 35 m.m., ♀ 4 m.m.; of hind femoia, ♂ 11 m.m., ♀ 11.5 m.m.

Colville, W. T., July 24.

This insect has been placed here provisionally, but will have to be removed to its proper place when the section of the family to which it belongs has been properly worked up in this country.

Pezotettix washingtonius, n. sp.

Yellowish white beneath, ferruginous above. Tegmina pointed, nearly two-fifths as long as the abdomen.

Head rather small, short; seen from the front somewhat quadrate. Vertex between the eyes a little wider (male), or once again as wide (female) as the first antennal joint, much depressed; deeply sulcate in the male, scarcely so in the female; sides nearly parallel, broadening slightly anteriorly; front margin not closed. Frontal costa rather prominent, nearly equal, contracted a trifle at the fastigium, edges rounded, not sulcate, rather coarsely punctured above the ocellus. Eyes large, rather prominent, rounded posteriorly, straight in front; equaling in length the portion of the cheeks below them. Face slightly arcuate, somewhat oblique. Pronotum with the sides nearly equal (male), or broadening slightly posteriorly (female); median carina distinct on the posterior lobe and the front margin of the anterior lobe in the male, and on the posterior lobe only in the female; lateral carinæ, or rather the lateral angles, middling sharp, nearly equal throughout, cut by the middle and last transverse incisions; disk punctulate; the three transverse sulci or incisions deep, the middle and last passing the lateral angles to the sides, posterior one about the middle. Sides of the pronotum somewhat gibbous, appearing as if composed of three well-defined lobes or segments when observed from above, most apparent in the male. Front margin nearly straight, very slightly truncate; posterior margin obtusely rounded. Meso- and meta-

thorax rather longer than usual, thereby throwing the base of the posterior femora about (female) or back of the middle of the body (male), and giving it a rather "long-waisted" appearance. Tegmina extending upon the second abdominal segment, ovate-lanceolate, meeting upon the dorsum. Abdomen carinated, rather slender; the last ventral segment of the male upturned, prow-shaped, with the point produced into a blunt projection; cerci rather long, the width about one third the length, directed a little backward and inward with the apex rounded and curving slightly forward; supra-anal plate triangular, the apex rounded and minutely notched, with a long, deep central foveola; marginal apophyses of the preceding segment small, wart-like projections. Posterior femora inflated at the base, rather smooth, extending beyond the apex of the abdomen. Prosternal spine large, conical, transverse, rather long, and directed backward. Antennæ normal, a trifle longer than the head and pronotum combined.

The general color is testaceo-ferruginous above, yellowish beneath. Face, occiput and disk of the pronotum flecked with numerous minute fuscous dots, which run together in some specimens and form rather large irregular blotches; a broad piceous band extending from the posterior edge of the eye along the upper margins of the lateral lobes of the pronotum to the last transverse incision. Meso- and meta-pleura dark brown or black with a stripe of the light color extending from the base of the tegmina to the insertion of the posterior femora. Tegmina dark brown with a few irregular, fuliginous dots along the middle area; nerves a little lighter. Posterior femora testaceous, with the base and two rather dim bands fuscous, these bands being plainest on the upper edge. There are also a few black dots along the lower edge of the disk and about the apex. Posterior tibiæ bright red, with the knee and spines black. Antennæ testaceous, becoming slightly infuscated apically.

Length of body, male 18.5 m.m., female 22 m.m.; of antennæ, male and female 8 m.m.; of tegmina, male 5.5 m.m., female 6 m.m.; of hind femora, male 10.5 m.m., female 12 m.m.

A large series at Loon Lake, Colville Valley, Washington Terr., July 25th.

Pezotettix enigma Scudd. Yakima River, July 16, and other localities in W. T.

Bradynotes opimus Scudd. Ten specimens of this clumsy, wingless locust were taken on Yakima River opposite Ellensburg, July 8, 9.

Bradynotes montanus, n. sp.

Small, comparatively slender, dark reddish brown, with livid yellow and white markings; tegmina sometimes obsolete, when present as in *Pezotettix gracilis*.

Vertex between the eyes very broad, slightly deflected, scarcely sulcate, with a very faint though perceptible transverse depressed line joining the upper extremities of the eyes, this line bending forward so as to form a gentle arc with the convexity to the front. Frontal costa moderate, nearly equal throughout, expanding a little at the ocellus, where it is very shallowly sulcate. Pronotum simple, expanding equally and rapidly posteriorly in the female, nearly equal in the male; front margin straight, posterior margin slightly but broadly truncate; median carina of the pronotum slight, visible throughout, on the anterior lobe as a mere smooth line not elevated in the least, in some specimens represented by a very faint depressed hair line, on the posterior lobe slightly elevated, the sides gently tapering; lateral carinæ obsolete, except in some specimens where they are visible on the extreme front edge of the anterior lobe as blunt shoulders. Anterior lobe coarsely and somewhat distantly, and the posterior minutely and thickly punctate, rugulose. Abdomen carinate, tapering gently and evenly backward. Tegmina situated low on the sides, small, straight, narrow, three times as long as broad, the apex rounded. Posterior femora short, somewhat tumid, nearly (female), or just reaching the tip of the abdomen (male). Last ventral segment of the male abdomen upturned, prow-shaped, entire; cerci elongate conical, with the tips directed backward and gently downward, reaching a trifle beyond the tip of the supra-anal plate. This latter very similar to that of *B. obesus*, but proportionally broader apically. Female cerci mere rudiments, while in *B. obesus* and *B. opimus* they nearly equal those of the male.

The general color is dark reddish brown with livid yellow and white markings above, flavous beneath. Face griseous yellow, becoming darker above, the vertex and occiput brownish fuscous; a very narrow but sharply defined yellow line commencing near the upper posterior angle of the eye, separating the occiput from the genæ and extending backward on to the pronotum, where the lateral carinæ would be if present; in some specimens a third line of a similar nature is present, beginning at the vertex and extending backward along the middle of the occiput. Sides of pronotum yellowish white, with a broad brownish piceous band extending from near the middle of the anterior lobe obliquely upward to the posterior

transverse incision; posterior lobe with the dorsal surface much lighter colored than the anterior lobe. Abdomen with a bright yellowish white line following the dorsal carina its entire length, this line bordered below by a black line followed by a medium broad band of the general color above; below this last band the sides of the abdomen are dull blackish or fuliginous. All these lateral lines and stripes fade away apically. Posterior femora brownish testaceous above, with the upper carinæ and inner and outer upper half of the apex black; there are very faint traces of the usual dusky bands present on the upper surface. Tibiæ yellow, spines black-tipped, tarsi yellowish with a lurid tinge.

In the living insect the colors are much brighter and contrast very strongly. The yellowish hair lines and dorsal line of the abdomen are glossy white, while the front and lower surface are of a bright lemon yellow. The brown is a bright hazel.

Length of body, male 17 m.m., female 22 m.m.; of pronotum, male 3.85 m.m., female 4 m.m.; of antennæ, male 6 m.m., female 6.75 m.m.; of tegmina (when present), male 2.25 m.m., female 2 m.m.; of hind femora, male 8.5 m.m., female 10 m.m.

Habitat.—Colville, Loon Lake, Washington Terr., July 23-25 (Dr. H. A. Hagen); also near Helena, Montana, among the trailing junipers on north mountain slopes at moderate elevations (L. Bruner). There were a few pairs in the present collection taken as cited above.

Melanoplus atlanis Riley. The collection contains quite a number of specimens that must be referred to this wide-spread and everywhere abundant species, although they vary considerably from typical specimens taken at the east. At various points in Washington Territory.

Melanoplus cinereus Scudd. Lone Tree, Yakima River, July 18.

Melanoplus infantilis Scudd. The collection contains a single female of this small species, which was taken at some point in eastern W. T.

Melanoplus curtus Scudd. A pair of short-winged Melanopli which are referred to this species without hesitation. This species is very closely related to *M. rectus*, an insect found in the mountains of New England.

Melanoplus femur-rubrum DeGeer. The collection contains but a single male specimen of this species, which comes near *M. interior* Scudd.

Melanoplus minor Scudd. There are two males of this well-marked species, which has, at various times, been referred to *Caloptenus occidentalis* Thomas, but which is quite distinct from that species. They were taken in eastern W. T.

Melanoplus Packardii Scudd. There are quite a number of this species in the collection, taken at Umatilla, Oreg., and also near Ellensburg. These specimens are interesting since they all have the hind tibiæ red instead of bluish, as in the typical specimens from Nebraska and neighboring States.

Melanoplus extremus Walker (?). The collection also contains a few specimens of a *Melanoplus* which is referred with some doubt to this species of Walker's. The insect in question is somewhat closely related to *M. atlanis* Riley, but differs from this species in its larger size, more robust form, comparatively shorter tegmina and wings, the much longer and more upturned last ventral segment of the male abdomen, and in the longer and broader cerci of the male. The general color is a dirty yellowish with markings of dull brown and black, arranged much as in *M. atlanis*. The female can be distinguished from that of *atlanis* in its more robust form and the much heavier and more rounded prosternal spine. Hind tibiæ dull yellow, with a very faint brownish tinge in some specimens.

There are also specimens of this insect in the collection of the U. S. National Museum from Ft. McLeod, British America, and Helena, Ft. Ellis and the Madison Valley, Montana, and also Salmon City, Idaho.

Melanoplus femoratus Burm. A few specimens from W. T.

Melanoplus ——— sp. The collection also contains a few specimens of what appears to be still another species somewhat closely related to *M. atlanis* and *M. scriptus* Walk., but which were not critically examined when the specimens were before me. These were also taken in W. T.

There are also quite a large number of specimens of the genus *Tettix* which I have not tried to determine, of which there are at least two species. I expect, however, to work up this section of the Acrididæ after I have more material at my command than at present.

GRYLLIDÆ.

Gryllus luctuosus Serv. ? The specimens in the collection which are referred to this species with some hesitation, are all females, and have the ovipositor very long, 16 m.m. Taken at Spokane, W. T., and Umatilla, Oreg.

Gryllus neglectus Scudd. There are five females of another species which are referred here. They have the ovipositor 10 m.m. in length. Portland, Oreg.

Gryllus ——— sp. Still another species of *Gryllus* is represented in the collection by two females and one male. These are somewhat larger than the preceding species and have the ovipositor 12.5 m.m. in length. One female taken at Portland, Oregon, June 19, a second at Camp Umatilla, June 27, and the third, a male, at Yakima River, July 18.

Gryllus ——— sp. The collection contains a single specimen of a fourth species, a female also. It has the posterior femora quite long and robust, reddish brown, and ovipositor of the same color, length of latter 13.75 m.m. Camp Umatilla, June 27.

Œcanthus ——— sp. I find in this collection some pupæ of an *Œcanthus*, probably *Œ. niveus*. Locality not noted.

There are also specimens of the following genera of Locustidæ that have not been carefully compared: *Udeopsilla*, 2 sp.; *Dectes*, 2 sp.; *Anabrus*, 1 sp.; *Stenopelmatus*, 1 sp.; *Orchelimum*, 1 sp.; *Xiphidium*, 1 sp.; *Ceuthophilus*, 1 sp.; and a single larva of a Mantid.

LARVA OF CHRYSOMELA CLIVICOLLIS, KIRBY.

BY G. H. FRENCH, CARBONDALE, ILL.

Length .30 of an inch; abdomen nearly globular, flattened beneath; head and thorax narrow. Head pale grayish yellow; thorax and abdomen pale gray, a dorsal blackish line on the abdomen and a transverse stripe of the same on the thorax. Stigmata black, legs pale, the articulations dark; two black spots on each side of the head. Body smooth, shining, a few hairs on the anterior part.

Chrysalis.—Length .40 of an inch; thorax, wing and leg cases rose pink, as also the under side of abdomen; upper side of abdomen pinkish gray with a dorsal pink line. Stigmata black. Each joint of abdomen has a transverse row of black points on its posterior edge.

This larva was found feeding on the leaves of *Enslenia albida*, a vine of the milk-weed family, August 21, 1884. Several times the beetles have been found on a prickly ash bush that grows not far from where this vine has grown in my yard for a number of years, but I could not see that they had eaten the leaves of the bush; but last summer both the larvæ and beetles were found on this vine eating the leaves, establishing the fact of food plant. The larva pupated September 2nd, and the imago appeared September 8th, giving six days as a pupal period.

CORRESPONDENCE.

Dear Sir : In my collecting notes for 1883 I find the following items :

"June 24. Took upon the ground under a white-wood tree, a male *Callosamia promethea*, with peculiar marks upon front wings."

"June 27. Two specimens of *promethea*, male and female, both showing the peculiarity of markings noticed in the one captured on 24th inst."

These were fresh specimens, evidently just hatched, and were found under the same white-wood tree. Examining the bushes and under-brush, I found an empty cocoon, apparently that of *promethea*, hanging to a beech shrub. Never having seen *angulifera*, and knowing there was no name in the Canadian list except *promethea* for such an insect to come under, I placed it in my collection as a variety of that species. Mr. Moffat pronounced it *angulifera* the moment he saw the specimens, and took home with him a male, sending me a male from Mr. James Angus in return. The latter specimen measures 4 inches, while the male of my own capture expands only 3¾, and the female a little over 4½ inches. As Mr. Moffat announced in the June number, these moths were taken near this village. A friend of mine, Mr. Avery, got one in the same woods this summer.

A. H. KILMAN, Ridgeway, Ont.

Dear Sir : In some collecting done the past season near McLean P. O., in the Northwest Territory, I found *Vanessa cardui* common, and during latter half of June saw a good many individuals of *Euptoieta claudia* Cramer. Neither of these butterflies appear in the lists of Capt. Geddes in CAN. ENT., Dec., 1883, and March, 1884. This occurrence of *claudia* is interesting, and to me rather a surprise. The locality mentioned is on the Can. Pac. Ry., 332 miles west of Winnipeg, and about 25 miles south-west of Fort Qu'Appelle.

THOS. E. BEAN.

Dear Sir : Dr. J. G. Morris writes me that he will have later, a letter from the son of the Rev. J. F. Melsheimer, the oldest son of F. V. Mel-Melsheimer. Rev. J. F. Melsheimer was a minister in Hanover from 1814 to 1826. He died in 1829, in Adams Co., Pa., and left three children, all of whom are living.

H. A. HAGEN, Cambridge, Mass.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., FEBRUARY, 1885. No. 2

THE COLLECTION OF PHYTOPTOCECIDIA, OR MITE GALLS, IN THE CAMBRIDGE MUSEUM.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The very extensive collection of galls from the U. S. presented to the Museum in 1870 by Baron von Osten Sacken, contains all his types. There are 138 different galls of Cynipidæ, gall flies 56 species, guest flies 23 species, parasites 66 species, and from Dr. Reinhard 38 types of European Cynipidæ. Further galls of other insects 121 species (Diptera 70, Hemiptera 30, etc.); the types of B. D. Walsh, galls of Salix, 13 species. To these were later added by the Baron his types of Colorado galls, 12 species, and those of California, 15 species. The permanent aim to enlarge this excellent collection has met with success. The prominent additions from Europe are 88 species from Mr. Brischke, in Danzig, Prussia, and 96 types of oak galls from Prof. G. Mayr, in Vienna, Austria, and 18 types of mite galls from Dr. Thomas. The additions of N. Am. galls are very numerous; prominent among them are large additions from California, Washington Terr., and Mexico.

There were among the galls of the Baron a small number of mite galls; fortunately, also, the types of the two species described by Mr. Walsh, and a number of fungi. As some deformations of plants by insects are very similar to the deformations by fungi, it was decided best to make also a collection of fungi. For the determination of these and of the mite galls, formerly considered to be fungi, I am deeply indebted to the untiring kindness of Prof. W. J. Farlow, who has also added to the collection a large number of specimens.

The advancement of the scientific knowledge of the mite galls is comparatively new and principally due to the numerous and incessant studies and publications of Dr. Fr. Thomas, in Ohrdruf, Gotha. His yearly Reports in Dr. L. Just's "Botanischer Jahresbericht" are indispensable to the student of mite galls.

The literature of the mite galls of the U. S., as far as known to me, is

small. Mr. B. D. Walsh, 1867, Proc. Ent. Soc. Phil., T. vi., p. 285-287, enumerates 20 species from Illinois, occurring on 14 different genera of woody plants. On Ulmus, 3 species; Populus, 1; Carya, 1; Salix, 2 (and probably several others); Quercus, many Acarideous semi-galls or mere woolly indented deformations of the leaf; Fraxinus, 2; Betula, 1; Juglans, 2; Crataegus, 1; Prunus, 1; Cerasus, 1; Tilia, 1; Cephalanthus, 1; Acer, 2; Negundo, 1. Only the two species on Salix are named and described.

Mr. H. Shimer, 1869, Trans. Amer. Ent. Soc., T. ii., p. 319, described from *Acer dasycarpum* a gall containing *Vasates quadripedes*, nov. gen. and sp. Mr. J. A. Ryder, 1879, Amer. Naturalist, T. xiii., p. 704, describes an Erineum on Acer.

Mr. W. H. Ashmead, 1879, CAN. ENT., T. xi., p. 159, describes *Typhlodromus oiliivorus** of oranges, as the cause of the rust of the fruit.

Mr. T. J. Burrill, 1880, Gardener's Monthly, January, and Am. Ent., T. iii., p. 26, describes *Typhlodromus pyri*, believed to be identical with the same species from Europe, in the pear-leaf blister.

There are in all known 24 species from the U. S., and 6 of them are described.

The following list of the species in the collection is arranged alphabetically after the plants, the species from Europe and those from America separately. The scientific description and the naming of the species will be the work of a monographer, and are not given here, because I believe this collection too small for such a purpose, the more as the mites are not represented.

I. From Europe. All except four by Mr. Brischke are from Dr. Fr. Thomas, to whom belong the notes given with each species. The often quoted paper on Phytoptus was first published in the "Programm der Realschule," etc., zu Ohrdruf, Gotha, 1869, 4th, pg. 29, pl. 1. Reprint, with additions to the paper, in Zeitschrift, f. d. ges. Naturniss., by Giebel Halle, 1869, T. 33, p. 313-366. Both are quoted as Progr., and as Add. Pl. means Pleurocecidia Thom., Acr. means Acrocecidia Thom.

1. *Acer campestre* L. Pl. Ohrdruf, Saxony; fall, 1879. Gall on leaves, *Cephaloneon myriadum* Bremi. Progr. p. 9, No. 9; Add. p. 335.
2. *Acer campestre* L. Pl. Ohrdruf, fall, 1879. *Cephaloneon solitarium* Bremi. Verhandl. d. *St. Gallischen* natur. Gesell., 1870-1871, p. 3.

* Corrected by Dr. Thomas in *oleivorus*.

3. *Acer campestre* L. Pl. (bark-gall on stems). Ohrdruf, 1879. Descr. Giebel's Zeitschr. 1879, T. 52, p. 740-745.
(*Achillea millefolium* L. Pl. Ohrdruf, fall, 1876.
Tyleuchus millefolii Tr. Loew. Verhand. Z. B. Gess. Wien., 1878. Thomas, Giebel's Zeitschr. 1874, T. 42, p. 522 (separ. p. 12).
The tuberculous leaf-galls are made by Anguillula, and belong not to Phytoptocecidia. I would not omit them, to draw the attention of students to this subject.)
4. *Alnus glutinosa* Gaertn. Pl. Ohrdruf, Sept. 1879; Danzig, Prussia, Brischke. Giebel's Zeitschr. 1869, T. 33, p. 337. Leaf-galls in the angles of the ribs, probably *Erineum axillare* Fée and *Xyloma alneum* Persoon. Mr. Brischke's specimen is labelled *Syncrista alni* Kirchner. This is published in Lotos, 1863, p. 46, a work not seen by me.
5. *Alnus glutinosa* Gaertn. Pl. Ohrdruf, 1879.
Erineum alneum Gaertn. on leaves.
6. *Alnus glutinosa* Gaertn. Pl. Danzig, Prussia, Brischke.
Bursifex alni Kirchner, Lotos 1863, p. 46. Thomas Progr. p 8, and Add. p. 334, as *Cephaloneon pustulatum* Bremi.
7. *Carpinus Betulus* L. Pl. Ohrdruf, fall, 1879. Frills and curled folds of the leaves; Steenstrup, quoted by Thomas, Addit. p. 324.
8. *Corylus avellana* L. Acr. Ohrdruf, 1878. Deformation of the buds. Thomas, Addit. p. 319; Dujardin, Ann. Sc. Nat., 1851.
9. *Fagus sylvatica* L. Pl. Ohrdruf, 1879.
Legnon circumscriptum Bremi. Thomas, Addit. p. 341. The margins of the leaves rolled up.
10. *Galium silvestre* Poll. Acr. Sudeten Mts., 1872, August. Thomas in Giebel's Zeitschr. 1877, T. 49, p. 384. (Vergruenung, Thom.)
11. *Lonicera xylosteum* L. Pl. Ohrdruf, June, 1880. Deformation of the margins of leaves. Thomas, Nova Acta Lesp. Carol. 1876, T. 38, p. 277, fig. 25, 26. *Legnon confusum* Bremi.
12. *Orlaya grandiflora* Hoffm. Acr. Dolmar, near Meiningen, August, 1875. Thomas in Giebel's Zeitschr. 1877, F. 49, p. 382 (Vergruenung, Thom.)
13. *Populus tremula* L. Pl. Ohrdruf, 1879. Thomas, Acta Nova l. c., p. 270, pl. x., f. 17-20. Galls on the basal glands of the leaves; the mite is named by Kirchner, Lotos, 1863, p. 45, *Heliazeus Populi;* it is a Phytoptus.

14. *Prunus domestica* L. Pl. Ohrdruf, fall, 1879. *Vulvulifex pruni* Amerling. *Cephaloneon hyppocrateriforme* Bremi. Thomas, Giebel's Zeitschr. 1869, T. 33, p. 330, and 1872, T. 39, p. 199. Leaf-galls.
15. *Pyrus communis* L. Pl. Ohrdruf, fall, 1879. Pox or pustules on the leaves. Thomas in Giebel's Zeitsch. 1872, T. 39, p. 473, and Sorauer Pflanzenkrankheiten, 1874, pl. I.
16. *Salix alba* L. Pl. Danzig, Prussia, Brischke. Leaf-galls. *Bursifex salicis* Amerling. Thomas, Progr. p. 2.
17. *Sarothamnus scoparius* Koch. Acr. Baden-Baden, August, 1877. Deformed axillar buds. Thomas in Giebel's Zeitschr, 1877, F. 49, p. 375-377, pl. 6, f. 6. The deformation is considered identical with Reaumur Min. 1737, T. iii., p. 423, pl. 35, f. 1,2.
18. *Sorbus aucuparia* L. Pl. Ohrdruf, 1879. Erineum, on the leaves.
19. *Thymus serpyllum* L. Acr. Ohrdruf, August, 1876. Deformation of the tips of buds.
20. *Tilia Europaea* L. Pl. Danzig, Prussia, Brischke. *Botherimus Tiliæ*, leaf-galls.

II. From North America.

21. *Acer rubrum* L. Pl. Washington, D. C. O. Sacken. Cephaloneon spec., numerous galls on the upper side of the leaves.
22. *Acer rubrum* L. Pl. White Mts., N. H., Sept. 1869. H. Hagen. Cephaloneon, on old leaves; galls in large numbers dispersed on the leaves.
23. *Acer rubrum* L.? Pl. Lynfield, Mass., June 13, 1867. H. Hagen, Cephaloneon; the upper side of very young leaves closely, almost entirely, covered by the galls.
24. *Acer saccharinum* Wang. Pl. W. St., O. Sacken; Cambridge, Mass., H. Hagen. Erineum, on the ribs, rather elongated.
25. *Acer saccharinum* Wang. Pl. Shelburne, N. H., August, 1882. Prof. Farlow. *Erineum roseum* Schult. (Farlow); small velvety patches on the upper side of the leaves.
26. *Acer dasycarpum* Ehrh. Pl. Shelburne, N. H., August, 1882. Prof. Farlow. *Erineum luteolum* Farl.; irregular velvety rusty patches on the under side of the leaves.
27. *Acer* spec. Pl. Illinois, spring, 1869. H. Shimer. Not seen by me;

Trans. Amer. Ent. Soc., T. ii., p. 319. Cephaloneon, perhaps the same as No. 23. The mite is *Vasates quadripedes* Shimer.

28. *Acer* spec. Pl. Prof. Barbeck. Not seen by me; Erineum. Mr. John A. Ryder, Amer. Naturalist, 1879, F. 13, p. 704-705. The mite is figured.

29. *Acer* spec. Pl. Bethlehem, N. H., August, 1870. Prof. L. Agassiz. "*Erineum purpurascens* (so called); not supposed to be a fungus, but a disease of the epidermis." Prof. Farlow. Large irregular black velvety patches upon the leaves.

30. *Alnus incana* Wied. Pl. Shelburne, N. H., Aug., 1882. Prof. Farlow. *Erineum alnigerum* Kze. (Farlow); small reddish or whitish flat woollen patches on the upper side of the leaves.

31. *Alnus serrulata* Ait. Pl. W. St., O. Sacken. Very small, widely scattered Cephaloneon galls on the upper side of the leaves.

32. *Alnus serrulata* Ait. Acr.? W. St., O. Sacken. A hypertrophy of the female aments by a fungus. *Taphrina alnitorque* Tulasne = *Ascomyzes Tarquinetii* Westendonk (Farlow). Baron O. Sacken believed it to be an Acarideous deformation; perhaps fungus and Acarus may be combined here. A hemipteron, *Cymus Resedæ* Pz., lives abundantly in the early spring in this deformation.

33. *Amelanchier Canadensis* Gray. Pl. Woods Holl, August, 1876. H. Hagen. Galls similar to a Phrygian cap, the tip rolled down, numerous on the upper side (rarely below) of the leaves; on the under side the Erineum opening. Mostly many galls on the same leaf.

34. *Amelanchier Canadensis* Gray. Pl. S. Truro, Mass., July 3-7, 1877. F. G. Sanborn. Similar to the foregoing, but a number of the galls larger, yellowish, the open tip woolly on the margin. Perhaps the ripe form of the foregoing.

35. *Aristolochia sipho* L. Herm. Pl. Harvard Arboretum, June 17, 1882. H. Hagen. Small woollen tuberculous galls on the underside of leaves; above small rounded openings, with white woollen margins. I am not entirely sure that it belongs to Acarus.

36. *Artemisia* spec. Acr. N. England. Prof. Farlow. Deformation of the buds; black globes of densely crowded filaments.

37. *Betula* spec. Acr. Massachusetts, 1880, November. Prof. Farlow. Densely crowded irregular deformations of the buds.

38. *Carya tomentosa* Nutt. Pl. Washington, D. C., June 13, 1861. O.

Sacken. Labeled as *Pemphigus caryæ venæ* by O. Sacken. The description of A. Fitch, Rep. iii., p. 444, for *Carya alba*, agrees; by B. D. Walsh, Pract. Entom., T. i., p. 3, it was declared to belong to Coccus, which is not accepted by Prof. Comstock. Perhaps it belongs to Phytoptus.

39. *Carya tomentosa* Nutt. Pl. U. S., O. Sacken. Deformation and folds on the leaves.

40. *Clematis* spec. Pl. Yakima City, Wash. Terr., July 3, 1882. S. Henshaw. Small, short whitish tubes, open at the end, crowded in oblong convex patches on the leaves, but also on the stalks of the buds and on the buds, therefore it would belong to Pl. and Acrocecidia.

41. *Cornus Canadensis* L. Pl. Mount Monadnok, N. H., Sept. 1883. Prof. Farlow. Erineum spec. Small blackish spots on the upper side of the leaves.

42. *Crataegus tomentosa* L. Pl. Rock Isl., Illinois, O. Sacken. Sent by B. D. Walsh as *Acarus crataegi vermiculus* Walsh. Leaf-curls. Proc. Ent. Soc. Phil. T. vi., p. 227.

43. *Crataegus crus-galli* L. Pl. Rock Isl., Illinois. O. Sacken. The same as the foregoing.

44. *Crataegus coccinea* L. Pl. Worcester, Mass., Sept. 7, 1879. Miss E. Sargent. Spinulose blackish galls on the upper side of the leaves.

45. *Diospyros Virginiana* L. Pl. Washington, D. C., Oct. 26, 1860. O. Sacken. Erineum, on the upper side of the leaves; small rounded, slightly elevated patches in great numbers.

46. *Elodes Virginica* Nutt. Pl. Illinois. Prof. Farlow. Very fine and very numerous black spots on the upper side of the leaves.

47. *Fagus ferruginea* Ait. Pl. Shelburne, N. H., August, 1882. Prof. Farlow. *Erineum ferrugineum* P. (Farlow). Irregular velvety rusty patches on the under side of the leaves.

48. *Fraxinus* spec. Pl. Massachusetts, 1880. Prof. Farlow. Cephaloneon, densely crowded, covering about the whole leaves above.

49. *Gerardia flava* L. Pl. Martha's Vineyard, Mass., August, 1872. H. Hagen. Deformation of the leaves.

50. *Juglans cinerea.* Pl. U. S. O. Sacken. *Erineum anomalum* Farl. It is the same mentioned by Walsh, Proc. Ent. Soc. Phil., T. vi., p. 227, "on the leaf stalk of the Black-Walnut gall. *Juglandis*

caulis Walsh, M.S., they reside among the brown external pubescence." The whole stalks are covered around by a thick brown velvet to the length of one inch. If I did not know the scrupulous accuracy of the Baron in labeling his specimens, I should believe that the specimens in the collection are types of Walsh sent to him, as they are indeed very similar to the preparation used by Walsh. I know nothing similar to this curious gall.

51. A leguminose plant. Pl. Santa Cruz, Cal., 1879. Prof. Farlow. The leaves are sprinkled above densely by very small black spots. The gall is very similar to those of *Elodes Virginica*.

52. *Plumbago* spec. Pl. Santa Cruz, Cal., 1879. Prof. Farlow. Galls similar to those of *Elodes Virginica*, but less numerous.

53. *Potentilla Pennsylvanica* L. Pl. Saskatchewan, Br. Amer., 1884. Prof. Farlow. Erineum, on the leaves; somewhat doubtful.

54. *Prunus maritima* Wang. Pl Waquoit, Mass., June, 1871. L. Agassiz. Deformation of the leaves.

55. *Prunus maritima* Wang. Pl. Woods Holl., Mass., August, 1876. H. Hagen. Long pedunculated black galls on the upper side of the leaves.

56. *Prunus maritima* Wang. Pl. Mass. H. Hagen. Similar to the foregoing, but probably a different species. The galls are green, smaller and much shorter pedunculated.

57. *Prunus serotina* Ehrh. Pl. Maryland. O. Sacken. Galls similar to those on *Pr. maritima* from Waquoit, No. 54.

58. *Prunus serotina* Ehrh. Pl. Westpoint, N. Y. O. Sacken. Galls similar to those on *Pr. maritima* from Mass. No. 56.

59. *Prunus serotina* Ehrh. Pl. Plum Creek, Col., June 27, 1873. O. Sacken. Similar to the foregoing, but different by shorter and most densely crowded galls.

60. *Prunus?* spec. Pl. Massachusetts, 1876. F. G. Sanborn. A very large Erineum.

61. *Prunus serotina* Ehrh. Pl. Cambridge, Mass., 1874. Mr. Bassett. Galls similar to those from Maryland, No. 57.

62. *Prunus*, spec. Pl. Weenass Valley, Wash. Terr., July 7, 1882. S. Henshaw. Small yellow pedunculated galls; very crowded on the upper side of the leaves, and around some stalks.

63. *Pyrus coronaria* L. Pl. Rock Isl., Illinois. O. Sacken. Erineum, on the under side of the leaves. I find it not described.

64. *Quercus bicolor* Wilden. Pl. Conn., by Mr. Bassett. O. Sacken. Upper side of leaf crowded with very small Cephaloneon; labeled as Podosoma.
65. *Quercus obtusiloba* Mich. Pl. Washington, D. C., October. O. Sacken. Deformation of leaves on the margin.
66. *Quercus* spec. Pl. Saltillo Mts., Mexico, Aug., 1879. Dr. Palmer. Deformation of leaf on margins.
67. *Quercus* spec. Pl. Colorado, 1873. W. L. Carpenter. O. Sacken. The gall belongs not to the three species described by the Baron in Hayden's Report for 1873, p. 567. The galls were labeled "Russ (sic.) galls," and are somewhat doubtful; oval, somewhat woolly, on the upper side of the leaves.
68. *Rhus toxicodendron* L. Pl. Malden, Mass., Sept. 1879. H. Hagen. Erineum, on the leaves.
69. *Salix nigra* Mars. Acr. Rock Isl., Illinois, Walsh. O. Sacken. The types of *Gall. Salicis Aenigma*. Walsh, Proc. Ent. Soc. Phil. T. iii., p. 608, and T. vi., p. 227. Deformation of the buds.
70. *Salix nigra* Mars. Pl. Rock Isl., Illinois, Walsh. O. Sacken. The types of *Gall. Salicis semen* Walsh, Proc. Ent. Soc. Phil., T. iii., p. 606, and T. vi., p. 227. Probably a Cephaloneon.
71. *Salix nigra* Mars. Pl. Wash. Terr., opposite Umatilla, June 27, 1882. S. Henshaw. Small and very crowded Cephaloneon galls upon the leaves.
72. *Spiraea* spec.? Pl. Cambridge, Mass., spring, 1877. H. Hagen. Probably Cephaloneon on the leaves.
73. *Tilia Americana* L. Pl. U. S. O. Sacken. Very shortly pedunculated galls on the upper side of the leaves.
74. *Thuja occidentalis* L. Pl. Mass., July, 1879. Prof. Farlow. Covered with eggs and skins; deformation of the leaves.
75. *Vaccinium* spec. Pl. Colville Valley, Wash. Terr., July 23, 1882. S. Henshaw. Small round galls on the leaves.

There are besides in the collection a number of specimens not yet sufficiently studied, as some cases of Phyllomania or Polyphyllia on pines and other plants, perhaps consequences of Phytoptus.

To the 51 American Phytoptus galls in the Collection of the Museum, must be added the four described, but not seen by me; by Mr. Shimer, on *Acer dasycarpum;* by Mr. Ryder, on *Acer;* by Mr. Ashmead, on oranges, and by Mr. Burrill, on pear leaves. Further, two shortly described

by Mr. Walsh (Proc. Ent. Soc. Phil., T. iii., p. 608, after the statements l. c., T. vi., p. 286) on *Betula nigra* and *Cephalanthus occidentalis*, both probably Cephaloneon. Further, after the list of Acarideous galls given by Mr. Walsh (l. c., T. vi., p. 285-286), 3 on Ulmus, 1 Populus, several on Quercus, 1 Juglans, 1 Negundo—in all 13 species not seen by me. Of these 68 galls, 56 are Pleurocecidia.

The 68 Phytoptus galls known from N. America belong to 42 species of plants, to 33 genera, and 23 families. Prunus has 7 different galls, Acer 5, Quercus at least 4; all other plants have less, mostly one gall.

It is obvious that this list is only a beginning of the knowledge of the Phytoptus galls in N. America, when we look on the large number of species discovered in Europe since more attention is given to them, principally by the untiring efforts of Dr. Fr. Thomas.

ENTOMOLOGICAL NOTES.

BY J. G. JACK, CHATEAUGUAY BASIN, QUEBEC.

The following notes on the habits of several insects are from a record of entomological observations kept during the past four years, and although imperfect, they may serve as a hint to others to pursue observations in the directions indicated.

During the past season few unusual specimens were taken and very few notes made. Diurnal Lepidoptera (with the single exception of *P. cardui*, which had been rare for some years) were unusually scarce. *Pieris rapæ* is becoming less numerous every year, owing, probably, to its many parasites. Moths were not so abundant as usual, and the only capture worthy of notice was the re-occurrence of *Aletia xylina* Say (the cotton-worm moth), a single good fresh specimen of which was taken October 26th, in the woods, among leaves near a butternut tree. There had been severe frost the night before, but the moth was quite lively when found. Looking through my note book, I find the following entries regarding this insect:—

"October 1st–15th, 1881. Found *Aletia xylina* Say quite common, especially in open barrels or heaps of decaying apples left in the orchard."

"Sept. 21, 1882. *Aletia xylina* Say taken at decaying fruit."

"Oct. 12, 1883. *Aletia xylina* Say taken at decaying apples. Not very common this year."

The decaying apples mentioned were windfalls that had been partly eaten by other insects before they were gathered, and put into heaps or old barrels to be fed to cattle. When these apples had stood in the sun a few days, the smell of ripe fruit from them became quite strong, and many moths, flies, etc., were attracted. It was here I found *Aletia xylina* most common, resting quietly on the bitten apples, and easily taken with the hand. They are nearly always in good condition, and although they are not easily "rubbed" and have the power of long sustained flight, I find it hard to agree with Professor Riley's opinion that they fly here every autumn from the Southern cotton fields. I think we will yet find there is a Northern food plant.

Dec. 30th, 1881. Found more than one hundred pupæ of *Drasteria erechtea* Hub. in a hollow piece of wood. They must have been collected and placed here by some small animal, possibly a wood-mouse.

Jan. 9, 1882. Found several examples of hybernating *V. milberti* under stones in a stone fence. I thought it worth noting that two or more were almost always found under the same stone or near together, and a considerable distance might intervene between each lot of specimens.

July 25, 1882. Several specimens of *V. antiopa* taken hovering over bushes of choke cherry *(P. virginiana)*, the leaves of which were much infested with aphides. The butterfly would alight on the curled leaves containing the aphides, and extending its tongue, insert it among them, and when engaged drinking the sweets furnished by the aphides, it could readily be taken with the hand. *Limenitis arthemis* and *L. disippus* were observed and taken similarly occupied. At a meeting of the Cambridge Ent. Club (Jan. 12th, 1883) I asked the members present if they had observed or known of such habits in these butterflies before, and received a negative reply. Also notice that *Phyciodes tharos* and other small red butterflies sometimes persistently follow *D. archippus* and other large butterflies of the same color. They alight when the large butterfly does, rising only when the larger insect takes to flight again. Is this for the sake of protection from some enemy?

The following note was made at the Experiment Grounds of the "Rural New-Yorker," River Edge, Bergen Co., N. J.:

"July 7, 1883. Found *Pronuba yuccasella* Riley in flowers of *Yucca filamentosa*. They are quiet during the day time, but become active in

the evening. Have not found them anywhere except in or upon flowers of this plant. Also observed a Humble-bee succeed in entering two or three of the flowers, and, clasping the stamens firmly with its legs, it reached the base of them with its tongue and usually went two or three times around. It had much difficulty in getting into the flowers. No other insects were observed about them. Could this bee fertilize *Yucca* flowers?

June 25, 1884. Found a young pear tree almost entirely defoliated by larvæ of *Vanessa antiopa*. I have never heard of the pear as a food plant of this insect.

Aug. 24. I noticed an ichneumon fly *(Ophion)* attempting to deposit eggs in or upon a larva of *Notodonta concinna*. After finding the position of the caterpillar, the *Ophion* brought its head pretty close to it, and then brought its abdomen and ovipositor up under its thorax and between its legs, apparently using its mandibles as a sort of guide or brace for the ovipositor. The *Ophion* was seen to probe the thoracic legs of the caterpillar with its piercer, but for what purpose I could not make out. The caterpillar was very much excited. For want of time I was obliged to give up further observation, and killed the specimens.

Aug. 25, 1884. The Buffalo Tree-hopper *(Ceresa bubalus* Fab.) is very abundant on the branches and trunks of young apple and pear trees, depositing eggs beneath the bark. They are sometimes so numerous as to literally cover the limbs of the trees, and the cutting up of the bark must do considerable injury.

Sept. 22, 1884. Found a larva of *S. drupiferarum* which was infested with parasites, which could be plainly seen just below the skin. An hour after it was taken, I looked at it again, and found nearly all the parasites making holes in the skin, one of them already having its body half through the hole just made. I put the larva in a paper bag and did not look at it again for two days, when I found it still living, but weak, and with circular marks on its back showing where the parasites had made their exit. In the bag I found a bunch of small cocoons, set side by side, on end, like the cells in honeycomb, all being firmly cemented together by a tough brownish substance.

DESCRIPTION OF LARVA OF AGROTIS DECLARATA, Wlk.

BY THE EDITOR.

Several specimens of the larva of this insect were received on the 8th of July, 1884, from Mr. Acton Burrows, Deputy Minister of Agriculture, Winnipeg, Manitoba. They were reported as seriously injuring vegetables and field crops in that Province.

Length, one and one half to one and three quarter inches.

Head medium in size, yellowish brown, with a polished surface, dotted and streaked with dark brown.

Form nearly cylindrical, tapering a little towards the head.

Body above dull grayish brown, in some specimens tinged with reddish; skin semi-transparent, showing the movements of the internal organs; cervical shield on second segment similar in color to the head. A pale dorsal line, a subdorsal and a stigmatal line of the same color. Below the stigmata and close to the under surface is a whitish band. On each segment there are a few small shining black dots which are arranged in a single transverse row on third and fourth segments. On the segments behind these there are additional dots forming an imperfect second row, but less regular in their arrangement. On each side of the middle segments, near the spiracles, there is a cluster of two or three of these black dots. No hairs proceed from any of these dots, but there are a few very minute short hairs scattered over the surface of the body, not visible without a magnifying lens. Spiracles oval, black.

Under surface paler and greenish, with whitish streaks, semi-transparent.

One specimen buried itself under the earth soon after they were received; shortly it became a chrysalis, and produced the imago August 23rd. All the others died before completing their transformations. The moth was kindly determined by Mr. John B. Smith, of Brooklyn, N. Y.

EUMACARIA BRUNNEARIA, Packard.

BY D. S. KELLICOTT, BUFFALO, N. Y.

I have recently obtained this elegant Phalenid from its larva, which feeds on the wild red cherry *(Prunus Pennsylvanica)*. July 8, several nearly mature caterpillars were discovered on the twigs of their food-

plant. They were an inch in length; color dull red, closely simulating the bark of the branches; and to more effectually conceal themselves by mimicry, they hold on, when at rest, by their pro-legs only, the body standing out like a short branch, or they hold to a leaf by their fore legs, making their bodies appear like a petiole.

The hemispherical head is red, with the edges along the fork of the epicranial suture white; the usual body stripes are represented by very faint, white lines; there are also faint whitish spots on the sides of the body. The spiracles are nearly round, situated on small black tubercles.

The pupæ formed under the leaves in the feeding cage, without cocoon. They were rather stout, front rounded and smooth; the last segment ends in a rather long spine with terminal hooklets. The surface of the abdominal rings with small alveoli. Pupa, July 12; moth, July 25.

A NEW PAMPHILA.

BY G. H. FRENCH, CARBONDALE, ILL.

Pamphila myus, n sp.

Male.—Expanse .95 of an inch. Upper surface dark olivaceous brown, with a slight vinous reflection, about the same shade as *cernes*, which it much resembles. The primaries have the discal cell and the area in front of the cell like *cernes*, heavily washed with yellow of a little darker shade than that species, the same color extending beyond the cell along the costal area three fourths the distance from the base to the outer margin (as the wings are spread); below the cell the same shade of yellow extends along the median vein the same distance, the area below this to the margin rather heavily sprinkled with yellow scales, except the space beyond the lower half of the stigma. This varies but little from the yellow of *cernes*. In *cernes* there is a quadrate sinus of the terminal dark brown of the wing dipping into the yellow beyond the cell, coming up to the cross vein. In this species the sinus is of the same width, but extends inward above the median vein, ending in a point half way to the base of the wing. The stigma is black, narrow, oblique, entire, though constricted below the middle, shorter than in *cernes*, does not reach the submedian below, and the upper end only reaches the second branch of the median, while in *cernes* it passes beyond this veinule, the lower third bent a little

towards the base, in width not more than half as wide as in *cernes;* below the stigma an oblong patch of blackish scales that are bronzy in certain lights. Secondaries sprinkled with yellow scales, the inner half with yellowish hairs that are less olivaceous than in *cernes.*

One specimen has on the primaries, marking what is above described as the outer boundary of the yellow, five small yellow spots that are paler than the yellow along the costa, three in a line back from the costa and two in the median interspaces; and the yellow washing does not quite reach to these spots, there being less yellow also at the base; varying in amount of yellow, as is sometimes seen in different specimens of *cernes.*

Under side of primaries much as above, the yellow orange-tinted, the row of slightly paler spots at the end of the yellow showing more distinctly than above, the apical half of terminal space sprinkled with yellow, the posterior half of wing blackish, the sinus beyond the cell heavily sprinkled over. Secondaries dark brown with the vinous reflection, sprinkled with pale yellow scales, a narrow discal band of small confluent whitish spots marking the outer third, much as in the species of *Amblyscirtes,* not very distinct.

Female.—This lacks the stigma of the male, is marked above much as the female of *cernes,* but is a darker and brighter yellow, the whole area in front of the cell and to the ante-apical spots nearly clear yellow, the rest of the basal two thirds sprinkled with yellow much as in the male. On the under side the obscure band on the secondaries is a little more distinct than in the male.

Body concolorous with the wings above, the thorax with olivaceous hairs, the abdomen sprinkled with yellow; beneath yellowish white, about the shade of *cernes.*

Described from four males and one female taken by H. K. Morrison in Florida.

NOTES ON APATELODES ANGELICA, Grote.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

Being on a visit to Ridgeway in July, 1882, when out one day with Mr. Kilman on a hunt, as I beat a high branch for beetles, a large moth new to me dropped into my umbrella. Having secured it in my poison bottle and remarked that I must now find its mate, another

stroke, and sure enough, I got it. I took a third at that time sitting on the trunk of a tree, which I left with Mr. Kilman. The following season he took one or two, and last spring he found some chrysalids under moss, from which he raised a pair. On visiting Prof. Kellicott, of Buffalo, Mr. Kilman left with him an example, that he might obtain its name. Mr. Kilman now writes to me that Prof. Kellicott has identified it as the *Apatelodes angelica* of Grote's Check List, with *hyalinopunctata* Pack. as a synonym, which latter name would have been more appropriate. Prof. Kellicott conveys the information that it is described and figured in the Proc. of the Ent. Soc. of Phil., iii., 322, plate iv., fig. 1. It is quite a fine moth. Of my pair the female measures 1⅞ inches in expanse at the apex, and 2⅛ at the sub-apical angle; the sub-apical is excavate. Edges of wings toothed, color of front wings lavender, with two light brown bands across them, the outer one continued on the hind wing; outside the latter are a row of brown dots on the nervules of the front wings. Near the apex are two transparent spots square in form, the one nearest the costa more than double the size of the one behind it. Color of hind wings light brownish-gray, with a heavy marginal band approaching the color of the front wing; an elevated longitudinal brown stripe in the middle of the thorax.

The male is but 1⅜ at the apex, and 1⅛ at the apical angle, in expanse of wing; it is the same in color as the female, but less distinct in its markings.

The attitude of the one I found sitting on the trunk of the tree reminded me very much of *Paonias excæcatus* when at rest. It stood high upon its legs, with its wings slightly spread and its abdomen elevated above their level.

I should mention that Mr. Johnston, of Hamilton, took a specimen in the season of 1881.

HIBERNATION OF COLEOPTERA.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The condition in which Coleoptera pass the winter is a subject on which there are in American literature but few recorded observations. That no species hibernates in the egg stage is highly probable, though in all the

others it occurs—some wintering in the perfect state alone, some in the larva and the imago condition, and others as larva and pupa.

Many of the species appear to make some preparation, retiring to situations that will more or less protect them from intense cold; others seem to have power to survive without any practical protection, as *Lixus concavus* and *Megilla maculata*, to be mentioned further on.

The majority are apparently subject to conditions that correspond to what is observed in warm blooded animals in a state of complete torpidity, namely: the absence of all detectable respiration; a temperature equal to that of the surrounding atmosphere till near the freezing point, and the power to survive a long entire deprivation of air, and even submersion in carbonic acid gas. There is no well substantiated case, that I have seen, of any of the above class reviving after a few hours submergence in water, except in that of certain swallows washed from their winter quarters in the low banks of streams by freshets; and while some of these appear to have resumed the functions of life partially, none have been resuscitated completely.

Many, if not all Coleoptera in the hiemal state in whatever stage, possess this latter power in an eminent degree, as is very evident from observations on the effects of winter inundations, as in the instance following. In February, 1884, a section of bottom land over one mile in length and one quarter in width, was entirely overflowed by the Allegheny to an average depth of five feet, and remained totally submerged over seven days. This is famous ground for Cicindelidæ and Carabidæ. Thousands of *C. repanda* are on the shore from April till November. *Carabus vinetus*, *Platynus melanarius*, *picipennis*, *extensicollis* and *anchomenoides*; *Pterostichus lucublandus*, *Sayi* and *luctuosus*; *Anisodactylus discoideus*, *Baltimorensis*, &c., &c., abound.

To all appearance no terrestrial life could survive such a protracted submergence, which over a considerable portion of this area was even a week longer; and yet, when the warm days of April came, here was *C. repanda* as numerous as ever; later appeared the various species of Carabidæ, many with the elytra encrusted with mud; and all kinds of insects seemed as abundant as in seasons in which no brumal overflow had occurred.

Lachnosterna futilis, which abounds in grassy places along the bank, was in no wise affected; nor was *Saperda concolor*, which inhabits the canes of a dwarf willow.

In the active state the species mentioned are readily drowned. In some experiments made to determine this point I found that few survived submersion in water for half an hour, and none for over an hour.

The degree of cold that can be endured without death is probably variable according to the species, the more tender retiring on the approach of cold weather deep into the earth, or into substances that are poor conductors of heat, as leaves, moss and decaying wood. Others that can sustain low temperatures without injury seem rather indifferent about the matter, crawling under any covering that happens to be convenient.

Some of the European entomologists by experiments seem to have satisfied themselves that the larvæ of some Lepidoptera may be congealed into masses of ice and fractured as readily as glass, and yet revive and regain their full activity. Though hard to believe, the statement is as worthy of credence as any that depends on human testimony. However, all the observations I have made on Coleoptera and their larvæ go to show the contrary, having never succeeded in reviving any in which there was absolute certainty of the tissues being frozen.

The larvæ of *Urographis fasciatus* and *Dendroides Canadensis*, which live within or just beneath the bark of fallen timber, were examined recently with reference to determining this question. They were found in their shallow excavations, the most of them surrounded by glittering crystals of ice. Nearly all were flexible and the tissues unfrozen, and mostly revived. A few were frozen solid and broke readily, none of these giving evidence of life.

A large number of the larvæ of *Dectes spinosus*, inhabiting the stems of *Ambrosia artemisifolia* (rag-weed) at or just below the surface of the ground, were taken out of their quarters. In many instances the stems had been filled with water and the larvæ were enclosed in cylinders of ice. The greater number were flexible and mostly regained activity on a rise of temperature; such, however, as were evidently congealed could not be resuscitated.

In the torpid condition some species of Coleoptera certainly have the power of sustaining vitality while exposed for a long time to a temperature below, or but little above the o of Fahr. The first week of this month (February) I found a large collection of *Megilla maculata* in a field, near a tree; they had congregated on the ground under and around a small piece of shingle that did not cover the half of them, and were massed together on top of one another to a considerable depth—all apparently

dead. Several were examined when found, and about one third of these proved to be entirely congealed, the remainder being flexible and showing signs of life when enclosed in the hand for a short time. The temperature to which these had been exposed was several degrees below zero, and for a couple of weeks scarcely ever more than 16 degrees above. Such collections of this species are not uncommon. I gathered up the full of a half ounce collecting bottle, leaving fully as many behind. In the warmth of my office, in a couple of days, about one half of those collected became active, though none that I regarded as frozen ever gave evidence of the slightest vitality.

During the very cold weather of last winter I found five specimens of *Lixus concavus* embedded near one another in ice in a patch of *Rumex* on low ground. A couple taken out without thawing appeared to be dead; sections were made in these in different directions with a sharp knife without detecting any frozen tissue, or any frost in the cavities of the bodies. The others were allowed to thaw out gradually and then they were discovered to be alive. Their after history is somewhat curious.

The tenacity of life possessed by this species has often been the subject of remark, and appears, from the following, to be greatly intensified by the mysterious changes that accompany the condition of torpidity. These three were thrown into strong alcohol, and on the third day were taken out and pinned, the time they were in it being over sixty hours. Five days afterwards they were observed to be alive and wriggling, their limbs quite lively; then they were pinned to the inner end of the cork stopper of a bottle containing cyanide of potassium, and when examined four days afterwards appeared to be as lively as when first pinned. How long afterwards they lived is unknown, as a long interval occurred before the next observation, and then they were truly dead.

By the foregoing it must not be inferred that I maintain the freezing of the tissues of torpid Coleoptera to be incompatible with the resumption of the functions of life—an opinion that would be, to say the least, presumptuous in the face of the many opposite experiments and observations by distinguished men.

The subject is one full of mystery and deserves the most careful attention.

CORRESPONDENCE.

XYLORYCTES SATYRUS AND STRATEGUS ANTAEUS.

Dear Sir: It must be assumed that Dr. H. A. Hagen was caught napping when he penned the note published in the CAN. ENTOM., Dec., 1884, vol. xvi., p. 239-240, for otherwise, with his predilection for the "literature" of entomology, he would not have failed to note that the capture of *Xyloryctes satyrus* north of Pennsylvania had been several times recorded. Presumably the reference to that species in the Am. Entom., Nov., 1868, vol. i, p. 60, was to specimens taken on Long Island, N. Y. This species is included in Mr. J. Pettit's "List of Coleoptera taken at Grimsby, Ont.," (CAN. ENTOM., April, 1870, vol. ii., p. 86), and in Mr. W. H. Harrington's "List of Ottawa Coleoptera," (Trans. Ottawa Field Nat. Club, 1883-4, vol. ii., No. 1, p. 80), and further, Mr. John Hamilton (CAN. ENTOM., June, 1884, vol. xvi., p. 107), writes of this species: "This large beetle is widely distributed, being found in Arizona, New Mexico, Texas, Kansas to Canada, and southward, and probably occurring wherever the ash and liquidambar grow." My mention, in 1884, of *X. satyrus* and *Strategus antaeus*, in the chapter "Coleoptera," of vol. ii., of Cassino's Standard Natural History, might readily be overlooked, since that work is of a somewhat popular nature. I there wrote, p. 370, "*S. antaeus* . . . . is found near the Atlantic coast of the United States as far north as Massachusetts. . . . . *X. satyrus* is found in the same regions as is *Strategus antaeus*." These statements were based upon specimens in my own small collection, which includes ten specimens of *X. satyrus*, from localities north of Pennsylvania. These localities are Cambridge, Springfield and Amherst, Mass.; Suffield, Conn.; and Montauk Point (the extreme eastern end of Long Island), N. Y. I have seen specimens of this species in abundance on the sidewalks of Sag Harbor, eastern Long Island, and will take care that even a Cambridge representative of the species is deposited in the entomological collection of the Museum of Comparative Zoology, of which Dr. Hagen takes such excellent care. Of *Strategus antaeus*, my collection has only a small series, as follows: Several specimens from Springfield, Mass., one from Michigan, and one from Cumberland Gap, Kentucky.

GEORGE DIMMOCK.

Cambridge, Mass., 16 Feb., 1885.

Dear Sir: I was particularly interested by Dr. Horn's remarks on *labyrinthica* or *pnirsa* in his notes on *Chrysomela* in a recent number of the CAN. ENT. When on the 23rd of May, 1881, I captured my first specimen on the wing, I regarded it with great satisfaction. The pure white of a fresh specimen contrasted with the glossy greenish black of its peculiar markings, makes it an exceedingly attractive object to the eye when first seen. I secured thirteen that season. Being eager to obtain its name, I sent specimens where I thought it likely to be got; they in turn applied to others, and then informed me, to my no small disappointment, that it was *multiguttis*. We find it restricted here exclusively to one locality, and that not extensive. In 1882 I searched carefully for it, and secured nineteen. On one occasion I found one paired with a *scalaris*, but *scalaris* is rarely met with there. In 1883 I took over eighty *pnirsa* without any special effort, and did not see half a dozen *scalaris* that season in that locality. My first capture of *pnirsa* in 1883 is dated 12th June; on the 16th I took nineteen, on the 21st, twenty-one. The last noted is the 9th July, but they were seen after that. Being from home during their season in 1884, I saw nothing of them, but was informed they were quite scarce. I have inferred that it cannot be a very abundant form from the fact that when it was sent to collectors in Buffalo and New York who have extensive collections and much experience in exchange, it was unknown to them. I find it very liable to discolor when drying, the white becoming rusty, which detracts much from the beauty of its appearance.

J. ALSTON MOFFAT, Hamilton, Ont.

Dear Sir: In reply to the question of Dr. Hagen (CAN. ENT., v. 16, p. 239–240) concerning the distribution of *Xyloryctes satyrus*, it may be of interest to note that the species has been recorded from various parts of Canada by Bell, D'Urban, Hamilton, Harrington, Pettit, Reed, Ritchie and Saunders; from Mass. by Harris (specimens from Martha's Vineyard and New York are in his collection); from Long Island, N. Y., and Illinois, by Walsh; near Buffalo, N. Y. (Lesch & Reinecke); near Cincinnati, Ohio (Dury); Lower Michigan (Hubbard & Schwarz); Davenport, Iowa (Putnam); Keutucky (Siewers); Texas, Kansas, Neb., Ariz. (LeConte); N. Mex. (Hamilton); Eastern, Middle and Western States (Ulke). I have collected it in Western Massachusetts and Rhode Island, and have specimens from Pa., Md., Wisc. and Mich.

SAML. HENSHAW, Boston, Mass.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., MARCH, 1885. No. 3

PREPARATORY STAGES OF ICTHYURA PALLA, FRENCH, WITH NOTES ON THE SPECIES.

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Globular, a little flattened at base, smooth; color orange yellow. Duration of this period, 24 days.

Young Larva.—Length .08 of an inch. Color pale brownish green. Head and a small cervical shield jet black. Each segment has about six blackish tubercles from which arise rather long gray hairs, the dorsal tubercles on segments 5 and 12 a little more prominent than the others. Duration of this period, 3 days.

After First Moult.—Length .14 of an inch. Color pale yellowish green. Head black, as also a plate and a small spot on the top of the second segment. To each segment six purplish black slightly tubercular spots; those on the dorsum faint except those on 5 and 12, which are prominent, each pair confluent; a few hairs from each spot. Thoracic feet black. Duration of this period, 4 days.

After Second Moult.—Length .25 of an inch. Color green, with a yellowish tint; head and thoracic feet jet black, the spot on the middle of the second segment and the plate black, but slightly purple tinted; the rest of the markings dark reddish purple. These consist of a dorsal line, with a very faint line each side; a more prominent subdorsal line, with a line each side composed of elongate spots, the breaks being at the ends of the segments, each spot a little broader in the middle than at the ends. The upper of these bordering line of spots contains the posterior dorsal piliferous spots, the anterior of each joint being in the line bordering the dorsal line. The line below the subdorsal contains the row of suprastigmatal piliferous spots. There is a faint stigmatal line with some mottlings below. Segments 5 and 12 slightly elevated, the anterior pair of spots closer together and colored; a spot on each abdominal leg. Duration of this period, 4 days.

After Third Moult.—Length .40 of an inch. The stripes remain the same as during the preceding period. The ground color of the dorsum

is bright yellow, reaching to the line containing the outer row of dorsal piliferous spots; below this line to the line below the subdorsal, pale whitish; below this the color is yellow. Duration of this period, 4 days.

After Fourth Moult.—Length .55 of an inch. The plan of color and markings unchanged save that the subdorsal color is grayish white, the elevations on joints 5 and 12 more prominent, and in same the dorsal yellow brighter.

After Fifth Moult.—Length 1 inch. Similar to the preceding stage, but varying a little in color. Dorsum clear yellow with three dark reddish purple stripes; below this grayish yellow, the two broadest of the three lines mottled, the upper one the most; below this, including the stigmatal line and the substigmatal space, reddish yellow; the stigmatal line red, much broken; venter concolorous with the substigmatal space. Thoracic feet, head and two spots on the neck jet black; joints 5 and 12 have each two prominent velvety black papillæ; a white hair from each piliferous spot, and in addition to this a fine short white pubescence covers the whole body, but not so thickly as to obscure the color.

Mature Larva.—Length from 1.10 to 1.20 inches; width of head .15 of an inch, of body .20. Dorsum lemon yellow with three purplish black stripes arranged as in preceding stages. Just above the stigmata is a narrow yellow line; between this and the yellow of the dorsum the ground color is gray, in some examples tinged with yellow on segments 2 to 5, in others it is a paler yellow; in the centre of this space is a purplish black line, and on both borders or edges of the space is a mottled stripe of the same hue. The stigmatal, substigmatal and ventral spaces, with the prolegs, somewhat carneous, the slight fleshy ridge below the stigmata being most so. In the upper part of the stigmatal space is a mottled line, the stigmata black. Head, thoracic feet and spots as at the first of the period. In some examples the stripes are more of a dark purplish red than black. Duration of this period from 4 to 7 days.

Chrysalis.—Length .55 of an inch; cylindrical; depth through thorax and the first abdominal segment .18 of an inch; through joint 3, .20; joint 4, .21; joint 5, .21; from here tapering gradually to the end, which is rounded, smooth, ending in a stylus with a hook at the end on each side. Surface smooth, shining, a few punctures between the joints, and the upper part of head and thorax a little roughened. Color dark chestnut brown, the eyes and a little shading at the end of the wing cases darker. Wing

cases extending back to posterior part of joint 5, leg and antennæ cases not so far. Duration of this period from 10 to 13 days.

For several years the larvæ of this species have been taken from the willows here, when nearly full grown, in September, and the moths obtained from them in the spring, but not till last spring (1884) did I succeed in taking the larvæ through all their stages. In 1883 eggs were obtained in large numbers, but they did not hatch, not for lack of being fertilized, because the larva developed inside the eggs to near the time for hatching, as could be seen through the shell. Two or three of them even came out, but in so weak a condition that they did not eat. I think they must have been affected by the disease that seemed to affect all Lepidopteral life that year.

These eggs were obtained May 11th, and the imagines were produced from July 7 to 13. There are two broods in a season, the larvæ feeding on willows *(Salix nigra)*, the last brood hibernating in the pupa state. In feeding they fasten the leaves of the ends of a twig together and feed in this larvarium, usually several feeding together. They do not pupate in this, but in the breeding cage spin close cocoons of brown silk in the corners of the box.

As a species this stands close to *inclusa*. There are several points of difference that seem to be permanent. It is of smaller size, out of a large series of reared and captured specimens none of the females being as large as all my females of *inclusa*, the most of them smaller than the males of that species; the males being proportionally smaller than the males of *inclusa*. In color the females are lighter than the *inclusa* females, the oblique transverse shades more brown tinted and less orange tinted; the ante-apical orange that in *inclusa* is a distinct patch across four or five subcostal interspaces separated by the veins, is in *palla* a mere stain, in no examples a defined patch, and in some scarcely distinguishable. The males average darker than the males of *inclusa*, both fore and hind wings being more of a brown of the vandyke-brown order, rather than umber, being more the shade of the male of *indentata*. In this sex the ante-apical orange is more distinct than in the female, but in about nine examples out of ten is still a stain instead of a patch, occasionally one showing about two very small spots that are fairly outlined.

Palla seems to be the species distributed over this portion of the United States. I found larvæ in Nebraska in 1882 that produced this species, and have had a number of specimens sent me from Central

Illinois, but have never seen *inclusa* in this region, though I have looked carefully for the larvæ in both willow and poplar for several years. If *palla* breeds as true to type in all localities where found as it does here, we shall have to regard it as a good species.

PROBABLE ORIGIN OF THE WORD BUTTERFLY.

BY FREDERICK CLARKSON, NEW YORK CITY.

The transformation of a grovelling worm to the glory that attaches to the winged aspirant of the heavens, has won for this insect from remote antiquity the appellation of Spirit or Soul, as typical of the resurrected human body. There is, I think, good reason to believe that the root meaning of the word Butterfly dates back to early Egyptian history, and as a hieroglyphic it is synonymous as representing the qualities of completeness and perfection which characterize the soul. I have supposed that it might serve the interest of this journal to record such historical gleanings bearing upon this subject as have come within my reach. It is said that in Yorkshire in England, the country folk call the night-flying white moths, Souls. This restricted application of the term very forcibly expresses what had been traditionally received by these people, and which they unwittingly have applied to certain white winged species. The English word Moth is said to be the Egyptian MUT or MAT. MAT is to pass; MUT to die; MATT, unfold, unwind, open, as the chrysalis entered the winged state and passed. The winged thing was a symbol of the Soul; it appears in the hieroglyphics as the Moth or Butterfly. The common view, we know, originates the word with the yellow Diurnae as illustrated in the butter-colored wings of the genus *Colias*. The word Butter is supposed to be derived from PUT (Eg.), food; and TER (Eg.), made, fabricated. The Butterfly may be the type PUT (Eg.), TER, complete, perfect. Thus in death (MUT) the Soul passed, unfolded like the Moth, whose chrysalis showed and was the type of the process, whence the Butterfly. Calling the Moth a Soul identifies the imagery as Egyptian. In Cornwall, in England, departed souls, moths and fairies are called Piskeys. Piskey is the same word as Psyche, and both are derived from the Egyptian, in which KHE is the soul, and SU is she; hence the fem-

inine nature of the Greek P-SU-KHE. Without the article, SAKHU is the understanding, the illuminator, the eye, and soul of being, that which inspires.

The ancients evidently were not very good Entomologists, for this original meaning, beautiful as it is, is altogether incompatible with the teachings of the modern science, for in these days we realize that the so-called spiritual life, as represented by the butterfly, is but a span in comparison with the earthly life, as illustrated by the larva, and that the heavenly aspiration and grace which mark the shorter life are the outcome of a comparative eternity of rioting and waste; yet, be it said, the silk worm at the eleventh hour makes a good record.

"Well were it for the world, if all
Who creep about this earthly ball,
Though shorter-lived than most he be,
Were useful in their kind as he."

Moreover, who that has ever attempted to capture a *Limenitis arthemis*, but has learned to his cost, that though a thing of beauty, and its possession a joy forever, its habits are deceitful. Well do I remember a chase for this butterfly - the first that I had ever seen on the wing. It was a royal game of tag, with hide-and-go-seek variations. We see-sawed up and down a ravine for nearly an hour. When first discovered it was regaling itself in the sunlight, upon a leaf about half way down the opposite bank, all the while jerking its wings, after a fashion, as if beckoning me over. By the time I had worked my way down over the rocks and through the briers, it was spreading its wings on the bank I had just left, and when I returned it was away again to its favorite leaf on the other side. Tired and heated, I gave up the chase, when the *arthemis*, in a most provoking way, lit upon a shrub beneath my very nose. This coquettish insect apparently realized my discomfiture, and after repeated approaches and withdrawals, it rose on wing, and with

"The light coquettes in sylphs aloft repair
And sport and flutter in the fields of air."

SHORT NOTES ON COLEOPTERA.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Hololepta fossularis Say. The habitatio of this insect is usually under locust bark in the first stages of decay, a fact so well known that collectors

would look for it in no other place. But last summer I found a number of them under the bark of *Ulmus fulva* (slippery elm), the odor of which in the same state of decomposition is as rank as that of *Robinia.* With them were several *H. lucida.* The individuals of these two species so approximate as in some examples to be scarcely separable; and indeed there is a reasonable doubt whether any of them are instinctively conscious of being specifically different.

Ips fasciatus Oliv. This well known species is very variable in size, color and sculpture. Several of these color variations have been described as species, as: *4-guttatus* Fab., *4-signatus* Say, *bipustulatus* Mels., *6-pustulatus* Reitter. *Quadriguttatus* Fab. is the European form, and though described subsequently to *fasciatus* Oliv., is still retained in the European catalogues, as the form *fasciatus* does not occur there, as I am informed.

The form *fasciatus* is the most common here, and is that into which all the others are resolved; in it the elytra are black with an irregular broad basal, and a sub-apical fascia, yellow; individuals are met with totally black without any spot; others have only a small basal and sub-apical spot yellow (more often reddish); others add to these a humeral lunule; others have various other spots, and by the gradual dilation and coalescing of these through a series of specimens, the full form *fasciatus* is reached, which can be readily verified by any one who takes the trouble.

The point I wish to present is the seasonal character of the melanism. I have never met with these black and spotted forms at any other time than in early spring, usually during April, at the sap of trees, especially birch and maple. As the season advances these entirely disappear, and the fasciate form alone remains, continuing till autumn. Some of these probably hibernate (though this is not established by observation), and appear in the spring among the recently developed melanotic variations. Whether the fasciate form decreases northwardly and increases southwardly has not been ascertained, but two specimens from Mt. Washington and two from Montana are of the form *4-guttatus.* As the species in the north extends across the continent, northern collectors might easily determine the matter. This insect is often found in the green ears of maize; but only in such as have been injured by birds or animals, which scarcely entitles it to be classed among the injurious.

Gaurotes abdominalis Bland. This graceful Longicorn occurs from Massachusetts to Western Virginia, but in restricted localities, which accounts for its being met with by so few collectors. It usually affects

wild places along streams that flow between rugged hills and mountains. Here it appears early in May on the blossoms of the wild plum, and a little later in more abundance on various species of Cornus *(C. circinata, C. paniculata* and *C. alternifolia)*, popularly known as swamp dog-wood, though the species mentioned do not usually grow on wet ground. It is also fond of laurel blossoms *(Kalmia latifolia* and *K. angustifolia)*. I have never observed it later than the first week in June. It is exceedingly wary and active, not being easily taken by beating. After a sudden noon-day shower I took over twenty specimens, by hand, from a low Cornus bush, into the cymes of which they had crawled for protection.

It greatly resembles *G. cyanipennis*, and like it, varies in color from bright green to copper and golden; but is always to be known by its rufous abdomen. The structural differences, notwithstanding the close similarity, are so great that eventually the two species may be placed in different genera. See Bulletin of Brooklyn Ent. Soc. v. 7, p. 107.

Saperda discoidea Fab. According to all the observations on record that I have seen, the larva of this beetle lives under the bark of diseased or deadened hickory and walnut, and before transforming penetrates the solid wood and there undergoes its changes. My own observations are not in accord with this. I once took from the thick bark of a hickory log in some cordwood, four mature individuals, the larvæ of which had fed partly on the bark and partly on the wood, and when approaching maturity had entered the bark and there disclosed. The past year, I found in May more than twenty of the full fed larvæ, pupæ, and beetles yet immature, in the bark of a large standing hickory that had been deadened about two years previously; they were all on the north side of the tree and none over fifteen inches from the ground. After feeding on the outer layers of wood till they had nearly attained their full growth, the larvæ had bored, instead of the wood, into the thick bark, closing their burrows in the usual way, and there transforming like the species of *Urographis* do in oak bark.

Where the larva selects the wood it may be legitimately inferred that the bark is not thick enough for its purposes. But how does it know whether the bark is thick or thin? This instinctive versatility in adapting itself to circumstances is only another of the mysterious things that meet the investigator of Nature at almost every step.

Dioedus punctatus Lec. is abundant here from April to September. It inhabits decaying oak (mostly of the red and chestnut species) that is

almost changed to humus. It is found in all its stages at the same time, and seems to have no other business than to hasten the destruction of its habitation. I have never met with a specimen elsewhere. Heretofore its habitatio has been given as under the bark of yellow pine.

Scolytus rugulosus Ratz. I have obtained this insect twice from hickory twigs placed in a box. The color of these is black, like *S. 4-spinosus*. I have others that are reddish-brown, said to be from peach trees. I have carefully looked for it several times in diseased trees of the last mentioned species, and also in pear trees affected by blight, but always with negative results.

Macrobasis unicolor Kirby is found here in countless numbers from the middle of July till the middle of August, on a leguminous plant *(Baptisia australis)* growing abundantly on the river shore, the foliage of which it eats with great avidity and entirely destroys. In Economic Entomology it is classed among the insects injurious to vegetation, according to Riley in the Missouri Reports, devouring potato vines, beans, the foliage of the apple and the honey locust; and on Mount Washington was found by Mr. F. Gardiner, jr., on *Pyrus americana*. Here it has not been observed to have such tastes, nor to eat any other than the plant mentioned, though potatoes, beans, &c., are cultivated very extensively close by.

From the observations of Mr. Riley as given in his paper, "On the Larval Characters and Habits of the Blister-beetles," &c., it is probable the young of this beetle live on the eggs of *Caloptenus femur-rubrum*, which is also very abundant on the river shore. The gray race is the only one occurring here, and fortunate is it for the farmers along the river that the insect prefers a useless weed to his beans and potatoes. I have experimented with them, and find they possess vesicatory properties equal to the imported *C. vesicatoria*, a fact, however, that is not new.

In the larval state of Coleoptera many live in decaying bark and wood, some confined to a single species, or the species of a genus and perhaps its allies. Hickory and beech are more palatable to a greater number than any other wood. The following seem to be omnivorous :—

Cucujus clavipes feeds on locust, maple, sycamore, wild cherry, hickory, white oak, elm ; *Clinidium sculptile* on spruce, hemlock, tamarack, black oak, hickory, chestnut, ash, gum, poplar, birch ; *Synchroa punctata* on all species of oak, hickory, apple, cherry, mulberry, osage orange, chestnut ; *Dendroides canadensis* on nearly everything.

LIST OF STAPHYLINIDÆ TAKEN AT BELLEVILLE, ONT.

BY PROF. J. T. BELL, SC. D.

Falagria dissecta.
" venustula.
Homalota—10 species not yet determined.
Aleochara lata.
" brachypterus.
" bimaculata.
Oxypoda sagulata.
Myllæna dubia.
Cilea silphoides.
Erchomus ventriculus.
Tachinus pallipes.
" fimbriatus.
Tachyporus brunneus.
" elegans.
Conosoma crassum.
Bolitobius cinticollis.
" dimidiatus.
" anticus.
Bryoporus rufescens.
Mycetoporus lepidus.
" americanus.
" flavicollis.
Heterothops fumigatus.
Creophilus maxillosus.
Leistotrophus cingulatus.
Staphylinus vulpinus.
" fossator.
" badipes.
" cinnamopterus.
" violaceus.
Ocypus ater.
Philonthus cyanipennis.
" æneus.
" palliatus.
" micans.
Xantholinus cephalus.
" obsidianus.
" obscurus.
Leptacinus flavipes.
Diochus Schaumii.
Lathrobium grande.
" punctulatum.
" simile.
" nigrum.
" tenue.
" collare.
" othioides.
" debile.
Cryptobium bicolor.
Stilicus biarmatus.
Lithocharis obsoleta.
Sunius binotatus.
" longiusculus.
Pæderus littorarius.
Dianous cœrulescens.
Stenus juno.
" 8 species undetermined.
Euæsthetus americanus.
Bledius semiferrugineus.
" emarginatus.
Oxytelus rugosus.
Trogophlœus 4-punctatus.
Olophrum obtectum.

Omalium rufipes.	Pycnoglypta lurida.
Protinus atomarius.	" convexa.
Micropeplus tesserula.	And about 6 species not yet identified.

A NEW TENTHREDINID.

BY L. PROVANCHER, CAP ROUGE, QUEBEC.

Genus *Synairema*, Hartig.

This genus was detached from *Tenthredo* by Hartig in 1837, for an insect described in 1793 by Panzer, under the name of *Tenthredo rubi*, found in Germany, Sweden, France, Tyrol, &c. In 1849, Bremi described a new species found in Helvetia, which he named *S. alpina*. It has not yet been recorded as met with in America.

Synairema differs only from *Tenthredo* by its lanceolate cell, which is largely contracted in the middle, while in the last it is separated by a straight nervule.

Synairema Americana, nov. sp.

♀.—Length .46 inch. Black; face below the antennæ, inner orbital lines reaching the occiput and thence curving inwards, mandibles, clypeus, palpi, genæ, scape underside, a spot on each side of the median lobe of mesothorax, a spot on tegulæ, scutel, a point before and another one behind, apex of basal plates, pleura and pectus in parts, white. Antennæ long, slender, black with a white spot on the scape underneath. Wings hyaline, nervures and stigma brown black. Legs white, including coxæ and trochanters, the two anterior pairs with a black line exteriorly on their femora, tibiæ and tarsi; the posterior pair black, with coxæ, except a black spot outside, trochanters and basal third of femora, white; the spines of their tibiæ, except the tips, and a ring at the base of the first joint of the tarsus, also white. Abdomen elongated, black, shining, venter more or less whitish on the sides. Valves of the terebra black, shortly exserted.

Captured one female at Cap Rouge.

LIST OF DIPTERA TAKEN IN THE VICINITY OF PHILADELPHIA FROM 1882 TO 1884, INCLUSIVE.

BY E. L. KEEN, PHILADELPHIA, PA.

The object of giving this list in its present imperfect form is to call the attention of our Entomologists to this greatly neglected order of insects, and as most of the families are still in an unworked condition, to call especial attention to them; of course, the named species represent only about one fourth of all the species taken by me during my three years collecting, and were mostly taken in Fairmount Park, and a few at Delanco, N. J.

If a few of our many Entomologists would turn their attention to the Diptera, they would be sure to find an interesting and very wide field, in fact there would be room enough for nearly a dozen systematic workers in this order.

At present the Diptera are receiving great attention from Dr. S. W. Williston, who has already greatly advanced the study of the order, and if we had a few more such workers, the Diptera would soon rise to as honorable a rank as is held by Coleoptera, etc.

Cecidomyidæ.

Took a few species, but none are determined.

Mycetophilidæ.

Species undetermined.

Simulidæ.

Simulium venustum (?) Say.

Bibionidæ.

Bibio albipennis, Say.
" femoratus, Wied.
Bibio articulatus, Say.
Scatopse atrata, Say.
And several undetermined species.

Culicidæ.

Culex ciliatus, Fabr.
" taeniorhynchus, Wied.
Anopheles quadrimaculatus, Say.
Several other species were taken, but are undetermined.

Chironomidæ.

There are a large number of species of this family, but they are not worked up.

Psychodidæ.

Took six species of this family on the bark of trees last summer; there are only two recorded in Osten Sacken's Catalogue.

Tipulidæ.

Geranomyia canadensis, Westw.
" rostrata, Say.
Rhypholophus nubilis, O. S.
Erioptera straminea, O. S.
" venusta, O. S.
Chionea valga, Har.
Symplecta punctipennis, Meig.
Epiphragma fascipennis, Say.
Limnophila montana, O. S.
Eriocera fuliginosa, O. S.
" spinosa, O. S.
Amalopis inconstans, O. S.
Bittacomorpha clavipes, Fabr.
Tipula abdominalis, Say.
" bella, Loew.
" costalis, Say.
" cunctans, Say.
" fasciata, Loew.
" fuliginosa, Say.
" hebes, Loew.
" infuscata, Loew.
" tricolor, Fabr.
Pachyrhina collaris, Say.

Besides the above there are quite a number of undetermined species.

Rhyphidæ.

Rhyphus alternatus, Say.
Rhyphus punctatus, Meig.

Stratiomyidæ.

Metoponia fuscitarsis, Say.
Beris viridis, Say.
Clitellaria subulata, Loew.
Stratiomyia marginalis, Loew.
Sargus decorus, Say.
" elegans, Loew.
Chloromyia viridis, Say.
Stratiomyia norma, Wied.

Also a number of undetermined species.

Tabanidæ.

Chrysops callidus, O. S.
" celer, O. S.
" excitans, Walk.
" flavidus, Wied.
" frigidus, O. S.
" fugax, O. S.
" niger, Macq.
" obsoletus, Wied.
" plangens, Wied.
" univittatus, Macq.
Chrysops vittatus, Wied.
Therioplectes lasiopthalmus, Macq.
Tabanus atratus, Fabr.
" costalis, Wied.
" lineola, Fabr.
" nigrovittatus, Macq.
" stygius, Say.
" sulcifrons, Macq.
" trimaculatus, Palisot-Beau.

Leptidæ.

Chrysopila ornata, Say.
" propinqua, Walk.
" quadrata, Say.
Chrysopila thoracica, Fabr.
Leptis punctipennis, Say.

Took quite a number of undetermined species of this family.

Asilidæ.

Leptogaster flavipes, Loew.
Stichopogon trifasciatus, Say.
Holcocephala abdominalis, Say.
" calva, Loew.
Deromyia discolor, Loew.
" umbrinus, Loew.
Atomosia glabrata, Say.
" puella, Wied.
Cerotainia macrocera, Say.
Dasyllis flavicollis, Say.
" thoracica, Fabr.
" tergissa, Say.
Pogonosoma dorsata, Say.
Laphria sericea, Say.
Mallophora laphroides, Wied.
" orcina, Wied.
Promachus Bastardii, Macq.
" quadratus, Wied.
Erax aestuans, Linn.
" Bastardi, Macq.
" lateralis, Macq.
" furax, Will.
Proctacanthus brevipennis, Wied.
" Philadelphicus, Macq.
Asilus Novæ Scotiæ, Macq.
" sericeus, Say.

Midaidæ.

Midas clavatus, Drury.

Bombylidæ.

Exoprosopa fascipennis, Say.
Anthrax alternata, Say.
" fulvohirta, Wied.
" lateralis, Say.
" sinuosa, Wied.
Argyramoeba limatulus, Say.
" Œdipus, Fabr.
" Simson, Fabr.
Bombylius fratellus, Wied.
" pulchellus, Loew.
" validus, Loew.
" varius, Fabr.
Sparnopolius fulvus, Wied.
Geron calvus, Loew.
Systropus macer, Loew.

Therevidæ.

Have quite a number of species, but none are determined.

Scenopinidæ.

Scenopinus fenestralis, Linn.

Empidæ.

Species of this family are quite plentiful around Philada., but I have none named.

Dolichopodidæ.

A large number of species are found here of this large family; only a few of mine are determined.

Dolichopus batillifer, Loew.
" bifractus, Loew.
" eudactylus, Loew.
Diaphorus spectabilis, Loew.
Scellus exustus, Walk.
Psilopus patibulatus, Say.
" sipho, Say.

Syrphidæ.

(See Vol. xvi., No. 8, pp. 145-147.)

Conopidæ.

Conops tibialis, Say.
Stylogaster neglecta, Will.

Have quite a number of undetermined species.

Pipunculidæ.

Took two or three species of this family, which are not as yet determined.

Tachinidæ.

Took about 50 species of this large family, of which the following are determined:—

Trichopoda pennipes, Fabr.
Exorista flavicauda (?) Riley.
Hystricia vivida, Harr.
Belvoisia bifasciata, Fabr.

Of *Dexidæ*, *Sarcophagidæ*, *Muscidæ*, *Anthomyidæ*, I took a very large amount, but for the most part the species are unnamed.

Cordyluridæ.

Cordylura bimaculata, Loew.
" setosa, Loew.
Scatophaga stercoraria, Linn.

Helomyzidæ.

Helomyza quinquepunctata, Say.

Sciomyzidæ.

Tetanocera arcuata, Loew.
" pictipes, Loew.
" plebeja, Loew.
Tetanocera saratogensis, Fitch.
Sepedon armipes, Loew.
" fuscipennis, Loew.

Psilidæ.

Loxocera cylindrica, Say.

Micropezidæ.

Calobata antennipennis, Say.

Ortalidæ.

Pyrgota undata, Wied.
Rivellia viridulans, R. Desv.
Callopistria annulipes, Macq.
Seoptera colon, Loew.

Camptoneura picta, Fabr. Chætopsis aenea, Wied.
Stictocephala vau, Say.

Trypetidæ.

Straussia longipennis, Wied. Euaresta bella, Loew.
Oedaspis polita, Loew. " festiva, Loew.
Eurosta solidaginis, Fitch.

Lonchæidæ.

Palloptera superba, Loew.

Sapromyzidæ.

Sapromyza compedita, Loew. Sapromyza philadelphica, Macq.

Diopsidæ.

Sphyracephala brevicornis, Say.

Ephydridæ.

Paralimna appendiculata, Loew.
Ochthera mantis, Deg. Also several other species.
Ephydra atrovirens, Loew.

Oscinidæ.

A few species around decayed fruits.

NORTH AMERICAN PYRALIDÆ.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

Crambus zeellus, n. s.

Expanse of wings, from 18 to 24 m. m.

Palpi, head and thorax, pale leaden gray. The labial palpi extend forward as far as the length of the head and thorax. The maxillary palpi are as long as the head.

Fore wings dull leaden gray, mixed with ashy and whitish, especially on the outer part, and crossed beyond the middle by two angulated dull ochre yellow lines, overlaid more or less with dark brown. The first line crosses the end of the cell where it is angulated. The second crosses the wing about half way between this last and the end. The terminal line is dark brown, and a dark brownish cloud extends obliquely in from the apex to the second line, but does not reach the costa. A narrow ochre yellow line, somewhat curved, extends from the middle of the base of the wing to the second line near the anal angle, and a similar line, though less

plainly marked, runs parallel, between this line and the hinder margin. The terminal space is more or less gray. The outer margin is regularly excavated below the apex. Fringes pale metallic lead color. Hind wings pale fuscous with lighter fringes. Under side of the body and all the wings pale fuscous.

Habitat.—Me., Penn., W. Va., Ill., Mo.

Bred from corn by Prof. S. A. Forbes.

I am under obligations to Lord Walsingham for comparing specimens of this and other species with the collections in London.

Crambus hulstellus, n. s.

Expanse of wings, 26 m. m.

Head, thorax and fore wings, chalky white. The palpi are somewhat fuscous on the outside, but white on the rest of their surface. Antennæ fuscous.

The fore wings are crossed by a twice angulated, brown, median line, much darker and heavier on the angles. This line starts from a point a little beyond the middle of the costa and runs out beyond the end of the cell where the first acute angle is formed. From this angle the line runs obliquely across the wing to the middle of the hinder margin forming the second angle just below the cell, beyond which the line is nearly obsolete. A double, yellowish line starts from the costa a little beyond the outer fourth, and curving downward runs nearly parallel with the outer margin, to the hinder margin a little within the anal angle. The terminal space is yellowish and this color fuses with the line so that it does not appear double except at the costa, and there is a row of seven black points along the outer margin. The space between the median and subterminal lines has six longitudinal, geminate brown dashes on the veins. The surface of the wing inside of the angles of the median line is covered with silver colored scales, and there are three dark brown dashes, one near the base above the hinder margin, the second outside of this and a little above, and the third extends along towards the second angle of the median line ; and the costa is more or less sordid. Cilia white with a silvery base which is broken by the white opposite the second and third black spots below the apex.

The hind wings are sordid white, with a narrow terminal border slightly darker. Cilia pure white. Under side of the hind wings lighter

than above, under side of fore wings sordid white, with the subterminal line and terminal black points reproduced.

Received from Texas by Rev. Geo. D. Hulst, for whom I take great pleasure in naming this species.

Eurycreon perplexalis, n. s.

Expanse of wings, 22 m. m.

Palpi and head mouse-colored. The base of the palpi beneath and a superciliary line, white. Thorax and fore wings pale mouse-colored, the latter overlaid more or less with whitish scales. The space between the reniform and oblique orbicular is whitish. The inner line is obsolete; the outer line starts at right angles from the costa, has a re-entrant angle outside of the upper part of the reniform spot, thence it is outwardly rounded and dentate with five teeth, down to vein two, where it sends a long blunt angle in towards the base of the wing, then turns and forms a similar but shorter outward angle, then runs to the hinder margin at right angles with it. This line is bordered on the outside with a narrow whitish shade, most prominent on the costa and before the hinder margin. The terminal line is dark and composed of confluent semi-lunate spots. The fringes are paler than the wings.

Hind wings pale gray, darker terminally, with the faintest indication of an extra median line. Fringes paler with a basal darker line. Under side of all the wings pale yellowish fuscous, with the markings of the upper surface faintly indicated.

Received from Texas by Rev. Geo. D. Hulst.

Botis inornatalis, n. s.

Expanse of wings, 13 m. m.

The head and palpi are pale snuff brown, the latter extend forward as far as the length of the head in front of it, and they are whitish underneath at the base, and the superciliary line is white.

The thorax and fore wings are of a light vinous red or reddish pink color, very near the color of *Botis signatalis*, but without markings of any kind. Fringes paler than the wings at the base, but whitish on the outer part.

Hind wings pale fuscous, lighter at the base, and stained with vinous red along the outer margin. The abdomen is concolorous with the hind wings.

Under side of the fore wings silky, fuscous and stained with vinous along the outer part of the costa. Under side of the hind wings lighter than above. Under side of the body, middle and hind legs, white and silky. The fore legs are pale fuscous.

This beautiful little species was collected in Florida and sent to me by Rev. Geo. D. Hulst.

CORRESPONDENCE.

XYLORYCTES SATYRUS.

Dear Sir: In answer to Dr. H. A. Hagen's query in the ENTOMOLOGIST for Dec., 1884, I have to say that some four years ago a boy brought me a living specimen, a fine male, of *Xyloryctes satyrus*, which he had taken in Bleecker's Woods, just outside of the city limits.

JAMES T. BELL, SC. D.

Belleville, Ont., Feb. 17th, 1885.

Dear Sir: Dr. Hagen asks in Dec. No. (Vol. xvi., p. 239) whether this beetle occurs further north than Pa. I find it recorded by Zesch and Reincke in their list of species captured within fifteen miles of Buffalo; by Howard and Schwarz in list of Coleoptera of lower peninsula of Michigan, presumably from Detroit; by Pettit, as captured at Grimsby, Ont., and by Prof. Bell, as taken near Belleville, Ont. It also occurs here—and this is probably the most northerly record for it—but is apparently rare. The only specimen I possess is a ♂ which was brought to me alive by a friend, but I have several times met with the elytra and other fragments of dead specimens in or under decayed logs. It is of course noticeable as being our largest representative of the Scarabæidæ, which in these colder regions only muster about forty species.

W. HAGUE HARRINGTON.

Ottawa, 25th Feb., 1885.

Dear Sir: I am able to add to the kind answers to my query by Messrs. G. Dimmock and S. Henshaw, two more. Prof. Chas. V. Riley writes me that August 18th, 1871, he found larvæ, pupæ and fresh beetles of *X. satyrus* quite common at Ridgewood, N. J., under old leaves in the

woods, especially in moist hollows; August, 1878, he found the beetles quite common, and in fact injuring the roots of ash trees in Babylon, L. I. Miss Emily L. Morton, Newburgh, N. J., states the frequent occurrence of *X. satyrus* on Long Island at various places, but has never seen a specimen of it taken in her own collecting grounds, New Windsor, N. Y., or vicinity. I have never made any lists of the distribution of insects except, of course, for some orders which belong to my special studies; but I have many times missed such a reference list for Coleoptera. I have been now informed that such a list is in the way of preparation. Even if I had time enough to undertake such a large work, I would have been prevented from doing it for a certain reason. If local lists should be taken as a basis for such a reference list of N. Am., it would be necessary to assume that the determinations of the species are unquestionable. That this is not the case in some lists of Coleoptera and Lepidoptera, I have been shown by specialists. Therefore if such a reference list should be of value, it must be worked by specialists who are able to control carefully the determinations. As in my large correspondence I am often asked to give information of the occurrence of species in certain localities, my way to answer these queries is to consult the collections in my care. So for beetles, the N. A. collection formed out of the collections of Melsheimer, Ziegler, Lewis, A. Agassiz, and all other beetles, formerly belonging to the Museum. Further, the collections of Dr. LeConte, Lt. Casey, and of the Peabody Academy, the two latter ones now belonging to the Museum; and finally of the general collection. If the result is not sufficient, I would like to apply to the knowledge of specialists, and the prompt answers now given will mostly settle the question. I should add that at least for Lepidoptera, I did begin the arrangement of the collection in a way to form a reference list, in placing a specimen of every State and of other important localities in the boxes, to have a graphical view of the distribution of each species. I have retained for this purpose specimens often in a very bad condition. But this plan, by which sometimes a whole box was needed for one species, outgrew the given limits of space. Nevertheless, for Odonata and some other families belonging to my specialty, I still retain this arrangement, which has given for some species of large distribution two closely filled boxes, and even more. When such species are studied and finally outworked, it will be of course possible to diminish the number of specimens. It would be an error to believe that I could do all this myself. My intention is to bring all specimens present in the

collection together in such a manner that the monographer or the student can find now or in later times the material which he needs for his study. To draw the attention of students to parts of the collection which are arranged as far as my knowledge goes, I did begin to publish during the last year lists of the contents of the collection, and will go on with such publications if they should prove to be useful. Through the addition of the collection of the Peabody Academy, the Museum possesses a very large number of types for Heterocera and Micro-Lepidoptera of N. Am., and a very large number of types of Europe. I have during many years given especial care to bring together a collection of types of the European fauna for comparison with the fauna of N. America.

Concerning my list of the Phytoptoceridia, I was most agreeably surprised by a letter of Prof. S. A. Forbes, and by a copy of the 12th Report, in which Mr. H. Garman has given an excellent paper on the Phytopti and other injurious plant mites. The copy of this Report which he has formerly forwarded to me has never reached my hands. As this paper is not quoted in Justis Jahresharict, it is new to me, and I am glad that the list is now directly advanced by such a prominent paper.

H. A. HAGEN.

EUPTOIETA CLAUDIA.

Dear Sir: In reply to the letter of Mr. Thos. E. Bean, in the Jan'y number of the ENTOMOLOGIST, I took several specimens of *Euptoieta claudia* last season in the Calgarry and Goose Lake region, and *Pyrameis cardui* was so plentiful from Toronto to Br. Columbia that I hardly considered it worth while to publish it on the list. *E. claudia* is added to my list in the Dec. number. I took the larvæ of *cardui* on both thistles and nettles all along the route. Yours truly,

GAMBLE GEDDES.

Government House, Toronto, 25th Feb., 1885.

[*E. claudia* was also among the insects collected by Miss F. M. Pierce, of Moose Mountain, N. W. T., last year, and forwarded for our Society's collection.—ED. C. E.]

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., APRIL, 1885. No. 4

DESCRIPTION OF SOME OF THE PREPARATORY STAGES OF PARNASSIUS SMINTHEUS, Doubl., AND OF P. CLODIUS, Men.

BY W. H. EDWARDS, COALBURGH, W. VA.

P. Smintheus.

Mr. W. L. Courtis, in 1883, sent me many eggs of this species, laid by females confined with Sedum. All the butterflies were of the variety *Hermodur*, H. Edw., the females being very black. I related Mr. Courtis's observations in Papilio III., p. 158. The eggs were forwarded to Dr. H. S. Jewett, Dayton, Ohio, in default of ice here, and were placed in an ice box in that town, and so remained till late in Jan., '84. I received them 28th. Two days after, several of the eggs were found to have hatched, the day being warm, 55° Far. at noon. I gave the larvæ leaves of our wild Sedum, and also of some cultivated sorts that I had brought together for the purpose. Three days later the wild leaves were noticed eaten or nibbled a little, the other sorts not all. In former years, at least twice, I had had these larvæ out of egg, and they refused our Sedum and starved. In the present case, little holes were eaten on the upper side of leaf, half way through the fleshy part. Several larvæ died speedily, but a few did well. On 5th Feb'y, two were visibly stouter than the rest. On 6th, I happened on some larvæ feeding, this time at the edges of the leaves. On 8th, the two largest began to swell at second segment; on 10th, one of these died in the effort to moult, the time from the egg being 11 days. On 12th, the other larva passed 1st moult, at 13 days. On 15th, a third passed same moult; next day another, and I was fortunate in seeing the process. Before this moult I endeavored to make the larvæ disclose the tentacles on second segment, and did so in some cases by pressing on the dorsum of segments after 2 with flat side of a pin. Teasing with the point of the pin effected nothing. The tentacles were stubby and very short, a mere lump of brownish-yellow color, without prongs. It was rather a tentacle, than tentacles. On 18th, another passed 1st moult. By pressing on dorsum, the tentacles after first moult

were brought out, two short stubby horns, bifurcated low down, color greenish-yellow, with a tint of brown.

On 22nd, the first larva which passed first moult was swollen for second; remained in that condition a long time, and finally passed second moult 27th. On 6th March, another was swollen for same moult. There were then but half a dozen left out of perhaps three score larvæ from the egg. Day after day they died, and by 11th every one had died. So that only one passed 2nd moult. This is but a melancholy showing, but it was much to get descriptions of three larval stages, and greatly enlarged drawings by Mrs. Peart of the first two stages. I learned something by the experience, and with another opportunity, I may perhaps reach pupa and imago. I got from Dr. Staudinger a beautifully prepared blown skin of Parn. *Apollo*, and from that could see that the larva of *Smintheus* at maturity would be closely like it. It was like it at the second stage, that is, with the first moult the larva had put on the characters of maturity very nearly.

I will give herewith the description of the stages observed, as it may be long before any thing more is known of this species, or of the preparatory stages of any of our Parnassians.

Egg.—Flattened, depressed at summit about the micropyle, the sides curved; the surface encrusted in hexagonal pattern, at each angle of every figure a minute cell; color chalk-white. Figured and described in But. N. A., vol. 1. The shape is like that of a Lycaena.

Young Larva.—Length .08 inch; cylindrical, tapering both on dorsum and sides from 3 or 4 to last segment, each segment well rounded; much covered with long, stiff, black hairs, or bristles; on dorsum are four rows of these, each hair springing from a little tubercle; on 2, 3, 4 these are arranged in a cross row, on the middle of the segment, on 2 they are equidistant, but on 3 and 4 there is a wider space between the 2nd and 3rd tubercle than the others; also on 2 is another cross row of 4 near the front, the pair on either side mid-dorsal line nearer together than the posterior tubercles on same segment; segments 4 to 13 inclusive have these hairs disposed in two rows, one being on the front part, the other on posterior part, and more widely separated; so that on these segments there are formed two dorsal longitudinal rows, and two sub-dorsal; the hairs on anterior segments are curved and directed forwards, from 5 to 10 are nearly erect, but still turned forwards; on the last segments turned back; high on the side is a row of large, flattened tubercles from 2 to 11, and

from each spring four hairs, separated at their bases, turned forwards and downwards; on 2, 3, 4 is a demi-row, mid-lateral, of similar but smaller and flattened tubercles, each bearing three hairs; lower down, and just below spiracles, on 4 to 13, are 2 hairs to each segment, from little tubercles not in line, but placed obliquely, so that the posterior tubercle is always a little above the other; along base, over feet and from 2 to 12, are 2 fine and short hairs to each, near together, turned down; some larvæ have all the large tubercles black, others have them light gray; the hairs are all light but black at base; under side and prolegs greenish-brown, the feet black; head obovoid, long, broader than high, depressed at top, the vertices rounded; black, the surface rough, with many fine black hairs; the larva from the first is able to project its tentacles, very short, pale brown-yellow, and so far as observed not bifurcated. Duration of this stage from 11 to 15 days.

After First Moult.—Length at 24 hours, .18 inch; shape as in first stage; color velvet-black, the lower part of side and under side greenish-brown; the processes on body are much as at first stage, but instead of single hairs from minute tubercles over dorsum, there are now four rows of small glossy black flattened tubercles, placed just as were the others mentioned, namely, two straight cross rows on 2, one row on 3, 4 each, in all these four in the row; in the following segments two cross rows each, two tubercles to the row, on front and rear, the former near together, or dorsal, the latter more separated and sub-dorsal; each of these tubercles bears four short hairs, separated at their bases; the upper lateral tubercles are large, rounded, flattened, running from 2 to 12, and bear from six to eight hairs; the demi-row on side of 2-4 is nearly in line with the tubercles below spiracles from 5 to 13, and this may be considered as a continuous lateral row, the lower lateral; on 2-4 there is a single tubercle to each, size of the dorsals, but the succeeding segments have two each, smaller, close together, the posterior one of the pair always a little higher than the other; the first three have five hairs each, the rest four, except on 13, where the tubercles are very small, and bear one or two hairs only; the hairs vary in length on each tubercle over the body, and in addition there are scattered hairs from the surface everywhere; on the dorsum of 2 the interior tubercles coalesce and are enlarged, and the hairs therefrom bend forward over the head; from 2 to 12 inclusive, in line with the upper lateral tubercles, on the posterior part of each segment, is a deep yellow oval or rounded spot; and on dorsum, between and in line with the sub-

dorsal tubercles, from 5 to 12, is a small and paler yellow oval spot; so that in all there are four longitudinal rows of these spots, the outer pair large, the inner small; legs black, pro-legs greenish-brown; head shaped as before, black, rough, with many scattered short hairs. Duration of this stage 15 days, in the only example which reached 2nd moult.

After Second Moult.—Length at 24 hours, .24 inch; in all respects as at second stage, except that the spots which were then yellow are now white. Before the third was completed the larva died.

The inflated skin of Parnassius *Apollo* spoken of above will serve to show what the mature larva of *Smintheus* would be like. The *Apollo* is black, covered thickly with short stiff black hairs. Where in the larva of *Smintheus* at 1st moult, is a row of yellow spots, in *Apollo* there is a row of large red ones, extending from 2 to 11, with smaller ones on 12 and 13. Instead of a dorsal row of smaller spots as in *Smintheus*, in *Apollo* the small spots are in line with the large ones, one on the front of each segment, and between 2 and 3, 3 and 4, is a small spot in addition. It is possible that the spots of *Smintheus* may again change color (having once changed from yellow to white, at 2nd moult) but I apprehend the white spots will remain till maturity.

The larva of Parnassius at every stage is unlike that of a Papilio, the only resemblance being in the presence in both of the scent organs, and the young larva seems to me more like that of certain Erycinidæ, for example, Lemonias *Nais*, as figured in But. N. A., V. 2. The egg is like Lemonias and Lycaena, and as is well known, the chrysalis is like that of a Hesperid, or some of the Heterocera, and very unlike the typical Papilionidæ. The more I see of the Parnassians, the more satisfied am I that their place is not with the Papilionidæ, but at the other end of the series, and near the Erycinidæ, where they should rank as a Family. I believe that the egg, larva in its stages, and the chrysalis is a better guide to the relationship of butterflies than the characters of the imago.

P. CLODIUS, Mén.

Egg.—Nearly plano-convex, the top being arched, the base flat, the edge about base rounded; at the summit a depression about the micropyle; when magnified to one inch diameter, the shape is very like that of a wooden button; color diluted coffee-brown; the upper surface covered by a crust, which is pitted with little round cells. (This egg much

resembles in shape and ornamentation that of Chrysophanus *Thoe*, whereas the egg of *Smintheus* is like a Lycaena, as L. *Pseudargiolus)*.

YOUNG LARVA.—Length at a few hours from egg, .08 inch; shape and markings of *Smintheus* at same stage; tapering on dorsum and sides from 3 or 4 to 13; the segments well rounded; color black, legs black, under side and pro-legs dark greenish-brown; on dorsum and sides black hairs, which spring from tubercles just as in *Smintheus*, the arrangement being of same description; head ob-ovoid, depressed at top, the vertices rounded; surface rough; color black; much covered with short black hairs.

The larvæ refused to eat Sedum, and soon died. In 1878, Mr. Mead brought from Nevada a large number of these eggs, obtained by confining the females on Sedum. I kept them in a cool room till last of Jan., '79, when they were placed in a warm one. A few larvæ hatched 31st Jan.

A NEW ARCTIAN.

BY HENRY EDWARDS, NEW YORK.

NEMEOPHILA SELWYNII, n. sp.

Head, thorax and abdomen, dull sooty black. Palpi, collar and tip of abdomen pale dull orange. Tegulæ, sides of abdomen and upper side of the tip of antennæ sordid white. Wings dull sooty black. At base of primaries a very distinct and clearly marked short white streak, and an oblique band (also cream white) from behind the middle of the costa to near the internal angle. This band, which is excavated at its junction with the cell, gradually narrows to a point as it reaches the outer margin. The fringe is white on the apical half of the margin, black elsewhere, and there is a small orange dash at the base of the costa. Secondaries wholly sooty black, fringe white, a little below the apex. Beneath the wings have a slate-colored shade, the markings of the upper surface repeated, the costa of primaries stained with orange at the base and at the edge of the white oblique band, while that of the secondaries has two whitish triangular blotches.

Expanse of wings, 35 m.m. Length of body, 13 m.m.

From 7 examples, ♂ ♀, taken by Prof. Macoun at Nipigon, Ont.

Though the species of the genus *Nemeophila* are subject to considerable variation, I can but believe that in the form before us we have to do

with a distinct and permanent species, the whole of the examples captured agreeing exactly with each other. It differs from *N. petrosa* Walk., *N. geometrica* Gr., and *N. Geddesii* Newm., in the shape and position of the bands on primaries, while in all the specimens examined there is on the secondaries an entire absence of white marks.

I have dedicated this interesting insect to Dr. Alfred R. C. Selwyn, LL. D., F. R. S., F. R. S. C., the distinguished Director of the Geol. and N. Hist. Survey of Canada, whom I have known for many years, both in Australia and America, as a close and careful student, and who has already taken important steps which cannot fail to promote a love for Entomology throughout the Dominion, and to produce the most valuable scientific results.*

A LIST OF COLEOPTERA COLLECTED IN LOUISIANA, ON OR SOUTH OF PARALLEL 30°.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The following species were collected, from 29th March to 21st June, 1884, along the thirtieth parallel in two neighborhoods, New Orleans and environs, and a district on Bayou la Fourche extending from a little above Napoleonville a few miles south along the bayou. The latter is in Assumption Parish, and at the time of my visit was partially overflowed from the great crevasse of March, 1884. Though many of the species here given are well known to occur in the South Louisiana fauna, I give them all just as I collected them, with the view of noting their relative abundance or rarity, dates of occurrence, localities, etc., all of which together may contribute to make our knowledge of the fauna more complete. But it must be remembered that this is merely a record of how the species occurred to me during my stay, in which I collected only a small part of what might have been taken, could I have given my entire attention thereto. Nearly all those of the N. O. neighborhood were taken between the city and Lake Pontchartrain.

Some observations and notes on a number of the species in this list have been published in *Psyche* ("Notes on Some Coleoptera Taken in

* The exact locality and date of capture of this Arctian are thus given by Prof. Macoun: "In open grassy woods along an old road between the Hudson Bay Store and the C. P. R. track, three miles east of Red Rock Station, and one mile west of Nipigon Bridge, June 26th, 1884."

South Louisiana," *Psyche*, vol. iv., p. 219–222). For the identification of the species (except those marked with an asterisk) I am indebted to Dr. G. H. Horn, who kindly examined them for me.

CICINDELIDÆ.

Tetracha carolina (Linn.) One full grown larva dug from its hole, 10th April. Milnburg Road.*

Cicindela repanda Dej. One specimen seen (not taken) in an unpaved side street in New Orleans, first part of April. Same species seen also at the mouth of the Red River in Louisiana, 22nd June, and taken at Vicksburg, Miss., 23rd June.

" *tortuosa* Dej. One specimen taken on a low, sandy mud-flat of the Mississippi just below the mouth of the Red River in Louisiana, 22nd June. In company with *repanda*. This is the only species in the list which was not taken (or seen) on or south of parallel 30°.

CARABIDÆ.

Scarites substriatus Hald. Of occasional occurrence under logs in moist places, N. O.

" *subterraneus* Fabr. Same with preceding, N. O.

Brachynus lateralis Dej. A number taken under old wood on the edge of a wet forest, B. la F.

" *tormentarius* Lec. In colonies, often in company with *Galerita*, under logs (old railroad ties) and pieces of wood in low, moist places, on the edge of the swamp especially. †

" *fumans* (Fab.) A number taken under logs in drier places than preceding. N. O.

Panagæus cruxigerus Say. One specimen under a log on the edge of a muddy, wet forest, 4th May. B. la F.

Galerita janus Fabr. This and the next species in same places with *Brachynus tormentarius;* often found in company with that species.‡ Also overtaken running through passages made in a

* There are dummy roads running through the swamp from New Orleans to Milnburg, Spanish Fort and West End, three resorts on Lake Pontchartrain.

† Where no locality is given, the species will be understood to have been taken both in vicinity of New Orleans and on Bayou la Fourche.

‡ Where no date is given, unless otherwise stated, the species was more or less common during the time of my stay.

dry, rotten stump, probably by ants. Once attracted to lamp in the evening.

bicolor Drury. With preceding.

Casnonia ludoviciana Sallé. Three specimens taken from the inside of my canoe while out in the flooded forest; two of these, 13th June. Probably came from foliage. B. la F.

Leptotrachelus dorsalis (Fabr.) Two specimens taken separately on the heads of a wayside herb, 15th May, B. la F. They emitted a scent peculiar to many Carabs when disturbed.

Lebia viridis Say. One, B. la F.

" *analis* Dej. One, B. la F.

Apenes sinuata (Say). One, B. la F.

Callida decora (Fabr.) Several taken on foliage of elder hunting for prey, 23rd May. One at lamp in the evening, 15th May. Two others seen on the ground in the sun, first part of May. B. la F.

Platynus decorus (Say). One under old wood. N. O.

Loxandrus rectus (Say).

Pterostichus chalcites (Say). Several taken under old wood and clods of dirt, also running; uncultivated land and plantations.

Diplochila laticollis (Lec.) Several under old wood.

Dicaelus purpuratus Bon. Several under wood or logs. B. la F.

" *elongatus* Dej. One, same as preceding. B. la F.

Chlaenius fuscicornis Dej. Under logs and drift-wood.

" *laticollis* Say. With preceding. Also once attracted to lamp in the evening.

" *nemoralis* Say. With preceding, but occasionally in drier places and away from woods. Not many taken.

Anisodactylus dulcicollis (Laf.)

Selenophorus palliatus (Fabr.) One, B. la F.

Stenolophus ochropezus Say. One, B. la F.

" *dissimilis* Dej. Attracted to lamp in the evening. B. la F.

DYTISCIDÆ.

Cybister fimbriolatus Say. Several taken from a pool of water, 17th April, N. O. A pair (same species?) seen *in coitu* swimming on the edge of an overflowed forest on Bayou la Fourche, 23rd May.

Thermonectes basilaris (Harr.) One specimen in pail of water drawn from a cistern, 3rd May. B. la F.

GYRINIDÆ.

Dineutus emarginatus Say.

STAPHYLINIDÆ.

Staphylinus cinnamopterus Grav. One or two under old wood. B. la F.
Palaminus parcus (Lec.) One under wood, N. O.

EROTYLIDÆ.

Languria mozardi Latr. Several from plants.
" *angustata* (Beauv.) One on foliage (of elder?), 23rd May. B. la F.

NITIDULIDÆ.

Carpophilus dimidiatus Fabr. Two, B. la F.

COCCINELLIDÆ.

**Megilla maculata* (DeG.)
**Hippodamia convergens* Guér. B. la F.
Coccinella affinis Rand., and var. **venusta* Mels. Two specimens of the species, three of the variety, on foliage. B. la F.
**Cycloneda sanguinea* (Linn.)

LUCANIDÆ.

**Passalus cornutus* Fabr. B. la F.

SCARABAEIDÆ.

Canthon perplexus Lec. One, B. la F.
" *hudsonias* (Forst.) One, N. O.
Diplotaxis harperi Blanch. One, B. la F.
Anomala undulata Mels. One or two, B. la F.
Dyscinetus trachypygus Burm. Two, one from each neighborhood.
Ligyrus gibbosus (DeG.) One specimen in a cell in the earth in a sugar-cane row, about the first of May. B. la F.
" *rugiceps* Lec. One specimen in a cell in a cane row same as preceding, 2nd May. B. la F. *Ligyrus* did no injury to young cane about Napoleonville this season that came to my knowledge.
Euphoria melancholica (Gory). Quite abundant in flowers of thistles, also in some other flowers.

BUPRESTIDÆ.

Dicerca obscura (Fab.) Several specimens taken in the heat of the day on heads of wormwood and the common ragweed, 20th to 22nd May. B. la F.

ELATERIDÆ.

Drasterius dorsalis (Say). Several under old wood. B. la F.

Monocrepidius lividus (Deg.) One taken on the head of a stalk of wormwood, 21st May. B. la F.

LAMPYRIDÆ.

Lucidota atra (Fabr.) B. la F.

Pyropyga minuta Lec. One on foliage. B. la F.

Photuris pensylvanica (DeG.)

TELEPHORIDÆ.

**Chauliognathus marginatus* (Fabr.) Abundant on patches of a low, yellow-flowering herb; also on daisies and some other flowers. *In coitu*, 30th March to 17th April.

CERAMBYCIDÆ.

Elaphidion mucronatum (Fab.) One specimen, 21st May. B. la F.

" *incertum* Newm. Two taken on pine boarding, 5th and 9th June; and one attracted to lamp in the evening, 21st May. B. la F.

Xylotrechus colonus (Fab.) One attracted to lamp in the evening, 10th June. B. la F.

Neoclytus erythrocephalus (Fab.) One specimen taken in the heat of the day on the finely-cut foliage of the common ragweed, 18th May. B. la F.

**Desmocerus palliatus* (Forst.) On shrubs of elder bordering ditches on plantations, 21st to 27th April. *In coitu* 22nd to 27th April. B. la F.

Bellamira scalaris (Say). Several taken on elder and the common ragweed, 20th to 22nd May. *In coitu* same dates. B. la F.

Typocerus zebratus (Fab.) One, B. la F.

Leptura abdominalis Hald. Three specimens taken in the flooded forest on a pine or cypress stump, over a mile back of the levee, 6th June. One of them flew from the stump and alighted upon the foliage of a young tree, where it was captured. B. la F.

Acanthoderes quadrigibbus (Say). Several specimens taken on an unpainted, weather-beaten fence made of big, rough-hewn pickets, also one on a flour barrel and another on pine boarding, 16th to 25th May. B. la F.

Mecas inornata Say. Taken in considerable numbers exclusively upon

the leaves of the "wild artichoke," 25th May to 7th June. *In coitu* 2nd to 6th June. B. la F.

BRUCHIDÆ.

Caryoborus arthriticus (Fab.) Four dead and dried specimens found in September among some seeds of the scrub palmetto gathered near New Orleans in the first part of April, and with them were the hollow seed-shells from which they had emerged.

CHRYSOMELIDÆ.

Lema 6-punctata (Oliv.) One taken upon the leaves of some weeds along a low levee bank, 23rd May. B. la F.

**Chlamys plicata* (Fabr.)? One larva, a case-bearer, on foliage. B. la F.

Monachus saponatus (Fab.) Several. B. la F.

Cryptocephalus leucomelas Suffr. One specimen on a weed, 17th April. Spanish Fort.

Myochrous denticollis (Say). Two, B. la F.

Colaspis brunnea Fab. One perfect and one injured imago. B. la F.

**Plagiodera scripta* (Fabr.) In abundance on sprouts of cottonwood or poplar, both larvæ and imagines, and pairs *in coitu*, on the young and tender leaves, 4th May. B. la F.

Cerotoma caminea (Fab.) Several. B. la F.

**Diabrotica 12-punctata* (Oliv.)

Galeruca integra (Lec.) One. B. la F.

Disonycha pensylvanica (Illig.) One from each neighborhood.

Lactica ocreata Say. Several, B. la F.

Systena elongata (Fab.) One, B. la F.

Chelimorpha cassidea (Fab.) One specimen taken on a wild plant, 17th April. Spanish Fort.

Coptocycla aurichalcea (Fab.) One on a leaf of elder, 28th April. B. la F.

Noda convexa Say. Several, B. la F.

TENEBRIONIDÆ.

Nyctobates pensylvanica (DeG.) Two or three under dead bark, 27th April. B. la F.

Opatrinus notus (Say). Plentiful under old wood in dry places.

Tribolium madens (Charp.) One, N. O.

Alphitobius piceus (Oliv.) Several under old wood, N. O.

Strongylium tenuicolle (Say). One, B. la F.

MELANDRYIDÆ.

Penthe obliquata (Fabr.) Three under a log, 27th April. B. la F.

MORDELLIDÆ.

Rhipiphorus pectinatus (Fabr.) One on leaves of a wayside herb, 11th May. B. la F.

MELOIDÆ.

**Epicauta vittata* (Fab.) One running on the ground, 1st May. B. la F.

OTIORHYNCHIDÆ.

Tanymecus confertus Gyll. Two, B. la F.

Eudiagogus rosenschoeldi Fahrs. Two, one taken crawling on the ground by a road-side, 11th May, B. la F.; the other from N. O.

CURCULIONIDÆ.

Listronotus tuberosus Lec. Quite a number of this species taken clinging on the under side of railroad ties lying on the ground not in use, or pieces of wood in dry places, in company with the three following, first part of April. Milnburg Road.

" *callosus* Lec. With preceding, plentiful.

" *nebulosus* Lec. With two preceding, quite numerous.

" *frontalis* Lec. A number with the three preceding.

Macrops delumbis (Gyll.) One or two with *Listronotus.*

Eudocimus mannerheimii Boh. One pair *in coitu* taken in the flooded forest on a pine or cypress stump, over a mile back of the levee, 6th June. They were lying under a chip in a crevice on the top of the newly-cut stump. B. la F.

Lixus terminalis Lec. Two taken on stems of weeds, 27th April and 25th May. B. la F.

Lissorhoptrus simplex (Say). Several attracted to lamp in the evening, 14th and 23rd May. B. la F.

Conotrachelus cribricollis (Say). One, B. la F.

Chalcodermus aeneus Boh. Abundant on stems of elder along ditches on plantations, also taken on some young sprouts of cotton-wood or poplar. B. la F.

Baris nitida Lec. One, B. la F.

*Unknown *Rhyncophor.* Larvæ taken, 18th April, from tamarind seeds found strewn over the planks of the "levee" at New Orleans, where the Central American and Mexican steamers come in. One seed contained six or eight small, white larvæ, nearly spherical. At same time some of the larvæ were found in

other seeds, almost minute. Probably brought from some tropical American port.

BRENTHIDÆ.

Eupsalis minuta (Drury). Three ♂ specimens taken under chips, or in crevices, on a new pine or cypress stump over a mile out in the flooded forest, 6th June. B. la F.

CALANDRIDÆ.

**Rhodobaenus 13-punctatus* (Illig.) Quite plentiful on a wayside herb growing along the bayou on the grassy bank of the levee, and on the leaves and stems of the common ragweed, 11th May to 6th June. B. la F.

Sphenophorus pertinax Oliv. Under logs and pieces of wood in damp places burrowing in the mud, on which account they are generally covered with a crust of that material. Not uncommon near New Orleans (Milnburg and West End Roads); only one taken on Bayou la Fourche.

" *placidus* Say. In same places with preceding, but much less common. Only two taken, N. O.

**Calandra oryzae* Linn. In rice; and from an ear of Indian corn, every kernel of which was eaten out hollow and contained each a perfect weevil, 16th June. B. la F.

ANTHRIBIDÆ.

Araeocerus fasciculatus (Deg.) One, B. la F.

A WELL MERITED DISTINCTION.

The Entomological Society of France, at its meeting, March 11th, elected George H. Horn, M. D., Philadelphia, an honorary member, on account of his writings and scientific attainments in Entomology. This is a very great compliment, when it is considered that the Constitution of this Society—one of the most learned in Europe—limits the number of its honorary members to twelve, six native and six foreign.

DESCRIPTION OF A NEW SPECIES OF CHIONOBAS FROM BRITISH AMERICA.

BY W. H. EDWARDS, COALBURGH, W. VA.

CHIONOBAS MACOUNII.

MALE.—Expands 2.2 to 2.4 inches.

Upper side brown-orange, color of *C. Californica* Boisd.; occasional examples are dark, a dead-leaf-brown over whole surface; hind margins edged by a blackish border, of nearly equal width throughout, and extending to apex of primaries; but sometimes this border is widest on primaries; costa of primaries dark brown; in some examples this shade scarcely if at all crosses costal nervure, in others it encroaches on the cell more or less, and occasionally covers the whole cell; but in nearly all examples under view the cell is concolored with rest of wing; the oblique discal brown band, which is a conspicuous feature in the males of the allied species, does not appear in the present one, so far as the examples show; the coloration of the upper surface resembles that of the female of *Californica;* on secondaries, the costal margin is edged with brown, and just outside the end of cell is an expansion of this, which forms a large elongated patch, convex on interior side—not at all like the sub-triangular and small patch seen in *Californica* and *Iduna;* primaries have a black ocellus, rounded or oval, with white pupil on upper discoidal interspace, and a second on second median interspace, the last one usually blind, but sometimes pupillated; generally the lower ocellus is smallest, but occasionally is equal to the upper; one example under view has two additional black spots, as large as the ocellus on secondaries, one on the interspace next above each ocellus; another has mere points on these interspaces; secondaries have a small ocellus, either blind or with white pupil, in second median interspace; fringes of both wings alternately yellow-white and brown-black.

Under side of primaries paler, frequently yellowish; costal edge gray-white, specked and streaked transversely with dark brown, next before and at apex gray prevailing; the hind margin brown; the cell more or less specked with brown, and just beyond the middle from base crossed by a narrow brown stripe.

Secondaries usually gray-white over costal margin and to middle of cell, yellowish over remainder of wing, but sometimes the entire surface is

decidedly yellow, of a pale or whitish shade; streaked finely with dark brown most densely from base to outer edge of the discal band, beyond which the streaks permit the ground color to show more distinctly than elsewhere; in the darker examples the hind margin is washed with brown which shades gradually into the lighter area; the disk crossed by a broad irregular band, edged on either side by black; the outer border of this band begins on costa just above the angle and its general course is sinuous, with a slight angular incision on the sub-costal nervure, and a rounded one on lower median interspace, the extreme curve lying just outside the nervule; the outline of basal side of the band is a double curve, being at first convex towards base of wing, and on sub-costal, then a deep sinus on median, after which to inner margin wavy; the posterior half of the band is about half the width of the other part; on both wings the ocelli are repeated, and usually the lower on primaries is pupillated; in a line with the ocellus on secondaries is a series of white points across the wing, one on each interspace, but these are often wanting.

Body blackish-brown above, thorax black beneath, gray-brown over abdomen; legs black, the tibiæ and tarsi brown; palpi black; antennæ reddish-brown finely ringed with red; club yellow-brown, tipped ferruginous.

VAR. A.—The entire upper side of primaries dark brown except a space beyond the disk which includes the ocelli, this being of the usual shade, and like secondaries; and it is therefore like the band in Satyrus, as *S. Alope;* on under side the ocellar band is yellowish, and the dark area is limited on it in a wavy dark line which projects in an angle upon upper branch of median; the cell much streaked.

FEMALE unknown.

From 12 males, taken by Professor John Macoun, Botanist to the Geological and Natural History Survey of Canada, at Lake Nipigon, 1884, and in honor of whom I name the species. It is remarkable for the absence of the broad sexual brown-black band on fore wing, which is so conspicuous a feature of the other members of the group. It forms the connecting link between the *Californica* group and that of *Chryxus*. The upper surface of the Var. A is very like many male *Chryxus* in the arrangement of the light and dark shades of color. In general the male *Macounii* has the coloring of female *Californica*.

HATCHING LEPIDOPTERA THROUGH ARTIFICIAL HEAT, &c

(Continued from page 49, No. 3, 1884.)

BY PH. FISCHER, BUFFALO, N. Y.

Of the lot taken to the room Dec. 3rd, 1883, imagoes appeared as follows:—

Hem. tenuis, male, Jan. 16, 1884.
" " " 27 "
Telea poly., " " 27 "
Apat. lepusc., " 27 "
Telea poly., male, Mch. 10 "
" female, " 16 "

Pupæ from Feb. 1, 1884.

H. tenuis hatched 1 male, Feb. 24
" " 2 females " 26
" " 1 male 27
" " 1 " Mch. 1
" " 1 female " 3
" " 1 male " 4
" " 1 " " 13
" " 1 " " 14

Pupæ of different genera, Feb. 28, hatched as follows:

H. thysbe, male, March 13.....1
H. thysbe, female, Mch. 14.....2
" " " 30.....1
D. undulosa, male, Apr. 8.....1
Sph. drupifer. " " 18.....1
H. tenuis, male, fem. " 23.....2
" " " 26.....1
Sm. myops " May 9.....1
" female " 11.....1
D. chœrilus, male " 11.....1
Sm. myops " " 13.....1
" female " 14.....1
C. promethea, male " 30.....1
S. cecropia, female " 31.....1
T. polyph., male " 30.....1
" " " 31.....1
C. promethea " " 31.....1
S. cecropia, female, June 1.....1
C. promethea, male " 2.....2

So far my records. From this time the remaining pupæ were taken to a room not heated, and gradually emerged here, which they would probably have done at about the same time had they never been taken to a warmed room.

On *Call. promethea* and *Samia cynthia*, artificial heat seems to have not the least effect, as they were taken to a warm room in February, the first *C. promethea* not hatching until the 30th of May. Of the *Samia cynthia*, none hatched until late in June, as did the larger number of *C. promethea*. A number of these, *promethea* and *cynthia*, male and female of each species, were taken to a small room with a view to observe the copulating of the sexes, and with a faint hope of a crossing, for which latter purpose males of one species *(promethea)* were also put together with

females of *cynthia*, and *vice-versa*, in boxes, but in no case did pairing take place, the males and females crawling over each other as if they were all of one sex. The one window of this room was kept closed, which must have been the cause of non-pairing, as there was no current of air, consequently the males, which seemingly have to depend a good deal on the draft of air, were not able to locate the female. One crippled female of *Telea polyphemus* was taken outside towards evening, in June, and placed on a shrub. It was found copulating the next morning with a fine male of the same species, the female commencing to deposit its eggs during the following night. This shows that for successful copulating insects need the fresh air.

Of *Hyperchiria io* hatching in February and March, some (male and female) were also put together in a large box covered with gauze, but with the same result; none were found to pair, although left together for a week, during which time some males and females never left the spot where they settled the first day. No female of these deposited any eggs during that time, whilst of *S. cynthia* and *C. promethea* sterile eggs deposited in June and July could be counted by the thousand.

Description of an odd variation of *Telea polyphemus*, male, hatched last summer: Wings almost transparent. Primaries almost without any shading, the usual band near outer margin removed nearer towards ocelli, which itself is narrower as in typical form, elongate, nearly perpendicular with sharply pointed ends above and below, surrounded with yellow, then black, having on margin towards base a red band slightly intermixed with pale blue; above ocelli a dirty red dash extending to costa; the lower part of the irregular band near base wanting, leaving only the upper part, which is also more perpendicular, and crescent shaped. Near base almost entirely bare.

Secondaries unicolored, the usual dark band removed close to ocelli, bordered towards outer margin with a broad bare band. Ocelli the reverse in shape from those on primaries; outer line straight and inner line convex; bordered towards outer margin with a black band extending on the outer side around ocelli, terminating in a narrow crescent-shaped black line above, encircling a narrow light blue band which is itself shaded by a darker blue, crowned by a wide white band bordered with red. A second pale but dark wide band runs almost parallel with first, only broken by ocelli, which is altogether but a little over half as large as on typical

form. Antennæ well developed. Thorax nude; abdomen slightly hairy. Coloring on under side also abnormal. Size 4⅛ inches. This specimen is in my collection.

NOTE ON THE LARVA OF DARAPSA VERSICOLOR, CLEM., AS IT OCCURS IN THE VICINITY OF BUFFALO, N. Y.

In my note book I find a brief description of the larva of *D. versicolor*, which I here give: Head small, green. Body light green, deepening strongly on sides, slightly tapering towards caudal extremity, but much towards head from 4th segment. Oblique bands whitish. Caudal horn long, stout, strongly curved backwards. Stigmata light brick red with white. The general appearance is much like *D. choerilus*, but from which it may be distinguished by its smaller head. As the season advances the larger number are a beautiful dark reddish brown, much resembling the dry leaves often found rolled up, on its chief food plant, *Cephalanthus occidentalis*, or Swamp Button-bush. The larvæ are sometimes found plentiful in certain favorable localities, especially shady swamps. It spins a light cocoon on the ground, in which the pupa hibernates. The pupa is nearly identical with *D. choerilus*. The larva is generally found in July, very few in August. When disturbed the caterpillar draws its head and first three segments into the fourth. The moth is local and usually rare.

OBITUARY.

We regret to announce the death of one of our esteemed members, Mr. Wm. Murray, of Hamilton, Ontario, who passed away after a protracted illness early in March. He was an enthusiastic and industrious collector of both Lepidoptera and Coleoptera, and paid special attention to the Sphingidæ and the Catocalas. His collection, embracing a large number of specimens, has been bequeathed to the Entomological Society of Ontario, and is now safely deposited in the rooms of the Society.

BOOK NOTICES.

Contributions to the Descriptive and Systematic Coleopterology of North America, Part II., by Thos. L. Casey, U. S. A.; lge. 8vo., pp. 137.

Contains very full and careful descriptions of ninety-three new species of Coleoptera, and many new genera; also systematic revisions of several genera as represented in the United States. A very useful and valuable contribution to this department of Entomology.

On the North American Asilidæ, Parts I. and II., by S. W. Williston, M. D.; lge. 8vo., pp. 58. From the transactions of the Amer. Ent. Soc., xi., December, 1883, and xii., Jan., 1885.

These excellent papers contain descriptions of forty-three new species, together with fresh descriptions of many of the older forms. Part I. contains a very complete table of genera, with two plates illustrating the parts of the insects used in classification. Part II. contains convenient tables of the species belonging to the following genera: Laphria, Mallophora, Promachus, Erax and Proctacanthus, in which the chief distinguishing features of the species are briefly given.

Notes on the Systematic Position of Some North American Lepidoptera, by John B. Smith; 8vo., pp. 8, with one plate containing twenty-three figures, illustrating the structure of Zygaena, Eudryas, Alypia, Stiria, Pyromorpha, Conosoma and Ctenucha.

The Standard Natural History—Article, Heterocera, by C. H. Fernald.

We are indebted to the author for a copy of this interesting popular article on Moths, covering 45 pages small quarto, illustrated with 34 figures and one plate of silk worm moths.

Elephant Pipes in the Museum of the Academy of Natural Sciences, Davenport, Iowa, by Charles E. Putnam; 8vo., pp. 40, with one figure.

General Truths in Applied Entomology, by C. V. Riley; 8vo., pp. 7.

An essay read before the Georgia State Agricultural Society, relating chiefly to insecticides and the best methods of applying them.

Recent Advances in Economic Entomology, by C. V. Riley; 8vo., pp. 3.

A communication made to the Philosophical Society of Washington in reference to insecticides.

U. S. Department of Agriculture, Division of Entomology; Bulletin No. 4, 8vo., pp. 102.

This useful publication contains a report on Cranberry and Hop Insects, by John B. Smith; observations on the Rocky Mountain Locust, by Lawrence Bruner; on Insects Injurious to Cotton, Orange and Sugar Cane in Brazil, by John C. Branner; Effects of Cold upon the Scale Insects of the Orange in Florida, and extracts from correspondence containing many interesting facts relating to injurious insects.

CORRESPONDENCE.

Dear Sir: In a recent issue, among some entomological notes, Mr. J. G. Jack mentions having taken *V. antiopa* and other butterflies on choke cherry bushes that were infested with Aphides. Perhaps some observations of mine bearing on the same point might be of interest.

During Sept., 1883, I noticed that a small apple tree in our orchard that was in a circuit of about twenty sugaring trees, had become unproductive, only an occasional moth appearing, while neighboring trees would be well covered. Happening to look up into the tree one night, I discovered that it was swarmlng with moths, and a careful examination showed that the tree was literally covered with the apple plant-louse, *A. mali.* The moths proved to be principally *L. unipuncta* and *Arthosia bicoloraga*, but there were some *Agrotis c-nigrum* and a few *Hadenas.* As I had never noticed this habit of the moths before, I kept on the watch for it afterwards, and found that the two former species could always be found where *A. mali* occurred in any numbers. During the autumn I took several species of the Noctuidæ, and at least one butterfly *(P. cardui)* on this infested tree. I have always taken *O. bicolorago* and *ferruginoides* largely on apple trees, and I now have little doubt but the plant lice are the principal attraction that draws them to these trees. I have also seen snow-ball bushes *(Virburnum opulus)* which were covered with Aphides, well patronized by the Noctuidæ, especially *Mamestra renigera, L. pallens, L. commoides* and *L. unipuncta.*

E. P. Van Duzee, Lancaster, N. Y.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., MAY, 1885. No. 5

FURTHER MATERIAL CONCERNING THE HESSIAN FLY.

COLLECTED BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The third report of the U. S. Entomological Commission, Washington, 1883, contains an excellent paper on the Hessian Fly, by Prof. A. S. Packard, p. 195-248, and in the appendix, p. 3-49, the translation of German papers by Loew, Wagner, Cohn, Koeppen, formerly not known by the Professor; also a reprint of my paper in the CAN. ENT., Oct., 1880, "The Hessian Fly not imported from Europe." The Professor accepts now (p. 238): That the Hessian Fly had appeared in the Eastern U. S. before the Revolutionary War, and that it could not have been introduced by the Hessians. He was not able to find in the files of the Pennsylvania *Mercury* and Philadelphia *Packet* some reference to the earlier occurrence of the H. Fly (App. p. 3).

I have tried since my paper was published to make further investigations in the old American literature. Some startling discoveries will probably necessitate the modification of some of the conclusions of the Professor. But I have frankly to state that I found it very hard to investigate the older literature. The publications treating agriculturally are rare, and at least in the libraries to which I have access, mostly incomplete. Mr. A. Fitch made the same complaint forty years ago. He was not able to compare some very important papers, though his publications show clearly that perhaps no one has tried to bring together the literature with a similar care.

The Occurrence of the Hessian Fly in North America before the Revolution.

The American Philosophical Society of Philadelphia appointed, in 1791, a committee for the purpose of collecting, and communicating to the Society, materials for the natural history of the insect called Hessian Fly, as also information of the best means of preventing or destroying the insect, and whatever else relating to the same might be interesting to agriculture.

At a meeting of the committee, April 17, 1792, it was resolved, that for obtaining information of the facts necessary for forming the natural history of this insect, *before its entire evanishment from among us*, it be recommended to all persons whose situation may have brought them into acquaintance with any such facts, to communicate the same by letter, addressed to Thomas Jefferson, Esq., Secretary of the State to the United States.

Nine questions were proposed, on which information was particularly wanted. I quote here only the first.

" In what year, and at what time of the year, was this animal observed for the first time? Does it seem to have made its appearance in this country only of late years, or are there any reasons for supposing that it was known in any part of the United States previously to the commencement of the late revolution?"

The resolutions of this meeting are printed in full in Carey's *American Museum* (Philadelphia, 1792, vol. xi., June, pp. 285-287) by the committee.—Thomas Jefferson, B. Smith Barton, James Hutchinson, Caspar Wistar. The *American Museum* was discontinued after 1792. The last volume contains no report of the committee.

As is obvious from the first question, it was at this time not settled whether the insect had been observed here before the revolution, or not. Mr. A. Fitch quotes the publication in the *American Museum*, and stated that no report had been made by the committee. The importance of this question, and of a committee with Jefferson at the head, led me to ask Prof. J. P. Lesley whether the old minutes of the Philosophical Society contain any unpublished report, or anything else relating to the Hessian Fly. I received from Mr. Henry Phillips, jun., secretary of the society, the following answer, under date of March 28, 1884 :—

At the request of Prof. Lesley, I have examined our old minutes in reference to the Hessian fly, and append on next page the results of my search. I know *positively** that before the revolution our newspapers are full of communications in reference to the Hessian Fly *eo nomine.* I cannot call to mind any one paper, but I remember perfectly frequently seeing these articles when reading for other purposes. I cannot find that the committee ever reported.

* The Italics are by Mr. H. Phillips.

Extracts from the Minutes.

1768, May 18. Com. on husbandry to consider whether any method can be fallen upon for preventing the damage done to wheat by the Hessian Fly. [*N. B.*—Mr. DuHamel has written on the subject.]

1768, June 21. Paper on the Hessian Fly read by Dr. Bond; ordered to be published. See No. 4, original papers.

1768, Oct. 18. Col. Landon Carter, Sabine Hill, Va. Observations on the fly weevil destructive to wheat; ordered to be published. [Is published in Vol. I. of the Transactions of the society. Cf. Harris, Injur. Ins., pp. 502. Dr. H. A. H.]

1791, April 15. Jefferson, Dr. Barton, Hutchinson, Thomson and Dr. Wistar, a committee to collect materials for forming the natural history of the Hessian Fly, and the best means for its prevention and destruction. [Do not find this committee ever reported. H. P.]

1791, Aug. 19. Memoir on Hessian Fly by T. L. Mitchell, of Long Island, read.

Everybody conversant with our actual knowledge and the literature on the Hessian Fly, will acknowledge it to be excusable that I took the liberty to again ask Mr. Phillips if by chance the year 1768, together with the name Hessian Fly, was not a clerical error; the more so, as Mr. Morgan, in Dobson's Encyclop. (vol. viii., p. 491), states, "The name of Hessian Fly was gven to this insect by myself and a friend early after its first appearance on Long Island."

I received from Mr. Phillips the following letter, dated April 1, 1884:—

1. 1768 is not an error. It occurs in the proper place in the old MS. vol., and there can be *no doubt* about the fact. *Similiter* the words *Hessian Fly.*

The term came in use in Pennsylvania from the early German immigrants long before the revolution. I am *sure* the term occurs in our Pennsylvania gazettes long prior to that period.

2. Cannot say if that paper (of Dr. Bond) was ever published. Possibly in some gazette *pro bono publico.* There is no clerical error as to the date and name.

Dobson is certainly incorrect in the statement you quote. [Mr. Morgan's pretension to have given the name Hessian Fly. Dr. H. A. H.]

At this writing it is not an easy matter for me to *verify* my own statement as to the communications which I have seen in the early Pennsyl-

vania gazettes before the revolution. I have had great use often in days past for historical researches, and the recurrence of the name of the Hessian Fly in these early days was a frequent matter of conversation with me and friends, friends of two generations older than myself. While I am perfectly convinced that my memory is accurate, yet a statement of that nature should be verified for historical use. I regret I have not the present opportunity of so doing; yet, in view of the minutes of 1768 bearing upon the matter, I don't doubt the accuracy of my memory, although it was *obiter*.

The importance of these letters is an excuse for their publication, which is done with the permission of the writer.*

April 11th, 1884.

The old minutes of the Philosophical Society are now in the way of publication, and as they contain two papers in 1768 about the damage done to wheat by the Hessian Fly, both delivered in the first half of the year, the fly must have been observed in 1767, if not earlier. Dr. Bond's paper, No. 4 of original papers, ordered to be published by the Philosophical Society, has not yet been discovered. Of course the old tradition of the importation by the Hessian troops is now effectually done away with, but some other papers never quoted show that even seventy years ago this tradition had been considered as not acceptable. The President of the Philad. Soc. for Prom. Agr., Mr. Richard Peters, in his Notices for a Young Farmer, etc. (Mem. of the Soc., 1818, vol. iv., p. xxix), says: "Its name (Hessian Fly) does not prove its importation; for that appellation was bestowed during our revolutionary excitements, when everything we disliked was termed Hessian. *In Hesse they have not this vermin to annoy their crops.*" The Vice-President of the same Society, Mr. James Mease, M. D., in his address on the progress of agriculture, Jan. 14, 1817 (ibid. p. lx.) says: "The wheat . . . was much injured by its old enemy, the insect absurdly called Hessian Fly." Mr.

* The proof sheet of the minutes of the Am. Phil. Soc. has, p. 15:—

The Com. for Husbandry reported a paper on the Hessian Fly by Dr. Bond, which was read, and Dr. Bond was requested "to prepare it for the press, that it may be communicated to the public without loss of time." See No. 4 of original papers. Mr. H. Phillips, jr., to whom I am indebted for being able to compare myself the proof sheet, remarks that Dr. Bond was one Dr. Thomas Bond (1712–March 26, 1784), or it may have been Dr. Phineas Bond (1717–1773). Neither was British Consul at Philadelphia.

A. Fitch (Hessian Fly, p. 19) complains that he was unable to find in either of the largest libraries of the State of New York the vol. v. of those Memoirs, and has for the same reason not seen vol. iv. The series in the Harvard Library was procured by the care of Th. W. Harris, but vol. iii. is wanting, as it could not be procured by the Society. Mr. Harris' correspondence is affixed to the first volume, and shows how difficult it was in 1845 to get those Memoirs.

The opinion given by Mr. R. Peters concerning the origin of the name Hessian Fly is corroborated by Mr. Bond's relation upon another insect (Encycl. Britan. p. 494). "This insect," says he, "is called in Maryland the Revolution Fly, by the friends of the British Government; but from all I can learn it is not the same insect which originated on Long Island and is called the Hessian Fly (by way of opprobium) by those who favored the Revolution." Prof. Packard objects, p. 236, that the words, "before the arrival of the troops," in quoting Mr. Mitchell's statement—it (the H. Fly) was first discovered in the year 1776—are my own and not Mr. Mitchell's. If Prof. Packard had compared the Enc. Brit.,—he states that he had not seen it—he would have scarcely objected to my statement. The whole passage by Mitchell is interesting to be quoted in full: "As it (H. Fly) appeared *about* the time that the Hessian troops arrived, an opinion had gone abroad that they brought it along with them; but the Doctor (Mr. Mitchell) was of opinion that it is a native animal, nourished by some indigenous plant, but which then, for the first time, came among the wheat and found it proper food."

As it seems that the article, "Hessian Fly," in the Encycl. Britan., is not so well known as it merits to be, I have taken particular care to find out the editions in which it is contained. It appears first in the third edition, vol. viii., p. 489-495, in 1797, and exactly the same in Dobson's first edition, 1798, vol. viii., p. 489-495.* The only copy of the third edition I was able to find belongs to the Essex Institute in Salem, Mass. The fourth edition is rather rare; I have seen no copy, but Prof. W. B. Nichols has kindly compared a copy in the Brit. Museum; the title, Hessian Fly, in vol. x., 1810, is exactly identical with the third edition, and also with the fifth edition, 1817.

I was not able to see the sixth edition. In the seventh and eighth the article Hessian Fly is wanting, but in the ninth, 1880, appears a new one

* This edition is always quoted by me.

filling one page and a half. I cannot make out by whom the article in the third, fourth and fifth editions is written. It is not only interesting, but important, as it was largely used in the pamphlet printed by the order of the Parliament. I have not extracted the article in the Encyc. Britan., as the Dobson's edition at least is present in every library. But I shall quote in the Parliament pamphlet the letters reprinted or extracted in Encycl. Britan. The Encycl. Perthensis, vol. xi., p. 254-256, has the same article somewhat abridged.

In the three copies of the Brit. Parliamentary papers which I was able to consult, I found in the printed papers of the House of Commons that April 21, 1789, was ordered to be printed a paper entitled "Proceedings of His Majesty's Most Honorable Council, and Information Received Respecting an Insect Supposed to Infest the Wheat of the Territories of the United States of America." But the paper itself seems to be wanting in those three copies. Kirby speaks of a vast amount of material collected by the Council, which filled upwards of 200 octavo pages. As this paper contains several reports by Sir Joseph Banks and others, and as it seems to have been used only in the article of the Encycl. Britan., I was very eager to know something more. Prof. W. R. Nichols, of Boston, was so kind as to make in the British Museum the following index of the contents of this paper:—

This is a 4to pamphlet of 65 pages, and, of course, it would be too expensive a matter to have the whole thing copied without special directions. I will give you, however, a list of everything in the volume, and state just how long each portion is.

Contents of Paper Referred to.

1. Letter from Mr. Bond, Consul at Philadelphia, to the Marquis of Carmarthen, 22nd April, 1788; half page.

2. Letter from Sir Joseph Banks to the Marquis of C., 4th June, 1788; one page.

3. Order in Council forbidding any entry of wheat, etc., etc., 25th June, 1788; half page.

4. Minute of Council, 4th July, 1788; one and a half pages.

5. " " 5th " " " " (Containing statement by Sir Joseph Banks.)

6. Report of Sir Joseph Banks, proposing the mode of making experiment on the American wheat, 6th July, 1788; half page.

7. Order in Council directing the experiment to be made, 8th July, 1788; half page.

8. Further account of the Hessian Fly by Sir Joseph Banks, and a statement of the printed accounts published in America, 8th July, 1788; two pages.

9. Account of wheat imported into England, etc, tables; three pages.

10. " " " Scotland, etc., table; one page.

11. Report of examination of cargoes of wheat from N. Y. (including half page report of Sir J. Banks, 17th July, 1788); two and a third pages.

12. General report of Sir Joseph Banks respecting the Hessian Fly and Flying Weevil, 24th July 1788; three pages.

13. Minute of resolution of the Lords of the Council, not to permit the entry of any wheat which, upon inspection, shall be found to have been infected; but that it might be expedient for government to purchase such cargoes, and Order thereupon, 5th August, 1788; half page.

14. Return from the principal officers of the Customs, etc., etc., 6th August, 1788 (contains 6 line report of Sir J. B.); two pages.

15. Letter from M. Broussonet to His Grace the Duke of Dorset, 3rd September, 1788 (containing Extraits des Registres de la Société Royale d'Agriculture du 28 Aout, 1788; three pages.

16. Letter from Mr. Ewart to the Marquis of Carmarthen, dated Berlin, 9th Aug., 1788; quarter page.

17. Extract of a letter from Sir John Temple to the Marquis of Carmarthen, with four inclosures (letters from America), dated New York, 4th Sept., 1788; six pages.

[This includes a reference to the American Philosophical Transactions published in Philadelphia, in 1771.]

18. Letter from Sir Robert Murray Keith to the Marquis of C., dated Vienna, Oct. 8, 1788; half page.

19. Extract letter from Mr. Walpole to the M. of C., Oct. 23, 1788; two-thirds page.

20. Extract letter from Mr. Mathias to the M. of C. (with two inclosures), dated Hamburgh, 19th Sept., 1788; one and a quarter pages.

21. Letter from Mr. Gibson to the M. of C., dated Dantzig, 29th Oct., 1788; two-thirds page.

22. Letter from Mr. Bond to the M. of C., with its several inclosures, dated Philadelphia, 1st Oct., 1788; fifteen pages.

23. Extract letter from Lord Torrington to the Marq. of C., dated Brussels, July 28, 1788; two and a quarter pages.

24. Letter from Mr. Walpole to the M. of C., with copies of two inclosures, dated Manheim, Feb. 21, 1789; two pages.

25. Extract letter from Mr. Heathcote to the M. of C., with two inclosures, dated Bonn, Feb. 16, 1789; one and a quarter pages.

26. Report of Sir Joseph Banks upon the above correspondence, and information, dated 2nd March, 1789; two and a half pages.

[He refers at the end to the following books: Histoire d'un Insecte qui dévore les grains de l'Angoumois, par MM. Du Hamel & Tillet, Paris, 1762, 12mo.; Memoire sur l'accident que les Blés de la Recolte de cette Anneé ont Eprouvé en Poitou, etc., par MM. Parmentier & Cadet de Vaux, Paris, 1785, 8vo. On Root-worms, by M. Bierkander, published in the Transactions of the Royal Academy of Sciences of Stockholm, 1777. Della Malattie del grano in Erba, del Conte Francesco Ginanni, Pesaro, 1759, 4to. Mezzi per distrugerei Vermi che rodono il grano in Erba, etc., Abbate Bonaventura Corti. Printed in Scelta di Opuscoli interessanti, vol. 34, p. 3.]

27. Letter from Mr. Bond to the Marq. of C., with copy of inclosure, dated Philadelphia, November 3, 1788; one and two-thirds pages.

28. Letter from Mr. Bond to the Marq. of C., dated Philadelphia, Jan. 20, 1789; 1 page.

29. Extract letter from Sir Joseph Temple to the M. of C., with two inclosures, dated New York, Feb. 21, 1789; one and a quarter pages.

30. Extract letter from Mr. Miller to the M. of C., dated Charles Town, 12th Feb., 1789; quarter page.

I have compared with this index the statements given in the Encycl. Britan. (Dobson's Edit. is quoted) and have noted by the single numbers what I believed to be useful for a better understanding.

As of late years (E. B. p. 490) great quantities of wheat were exported from America into Britain, it became an object worthy of the attention of Government to consider how far it was proper to allow of such importation, lest this destructive insect might be brought along with the grain.

No. 1. Mr. Bond* informed that there was a design to export wheat from Philadelphia to England, that the fly had made great depredations,

* This Mr. Bond is not the Dr. Bond quoted before in the minutes of the Amer. Philosoph. Soc. I cannot find out anything more about him.

and that there might be danger of its thus being conveyed across the Atlantic. He added, it was not known where the eggs of the insect were deposited, though it was supposed to be in the grain (p. 490).

Nos. 2, 5, 7 and 8. Sir Joseph Banks mistook at first an insect called the Flying Weevil for the Hessian Fly. But in a little time he corrected his mistake, adding that the danger of importing this insect was much greater than that of the Hessian Fly. He proposed an examination of the corn already brought from America (p. 490).

No. 12. General report of Sir Joseph Banks. None of the grain which was examined showed any signs of the fly; but as some imported in August contained the chrysalis perhaps of the Flying Weevil, the cargo should not be suffered to come into the kingdom (p. 490–491).

No 15. Speaks of two insects infesting the wheat in France. The Royal Soc. of Agriculture remarked that the larva of one of them does not appear to differ from the American insect (the quotation of the Stockholm Memoirs leads to the supposition that this is Oscinis.—Dr. H. A. H.) The mischief which they do to the corn having never been considerable enough to attract the attention of the Government, the Society regrets not being able to say anything particular upon that subject (p. 491).

No. 17. Sir John Temple, at New York, the British Consul-general, gives the statements of Mr. Morgan quoted by A. Fitch (491-492).

No. 22. Mr. Bond gives good information, which is at some length reprinted (p. 492-493).

No. 26. From the whole correspondence on this subject, Sir Joseph Banks drew up a report for the Privy Council, which is also reprinted at some length, together with an appendix dated April 27, 1879 (p. 493-494).

No. 28. Mr. Bond's letter (p. 495).

As much as the Professor has, after the study of the German literature, changed his former opinions and conclusions, he will have to change the remainder of his conclusions after a closer study of the American literature.

"Now if the Hessian Fly (Packard, p. 239) had been indigenous many years before 1776 in the wheat fields of this country, some at least would probably have been carried in loads of grain to England." The discovery in the minutes of the Amer. Philos. Soc. makes this presumption untenable. The same is the case with the following supposition (p. 239): "On the other hand, it may have been imported into the French colonies in Canada from Southern France, by immigrants." But it is well known that the immigrants into the French colonies in Canada came all from the

north-western parts of France. There is nothing known about a trade between Canada and the Mediterranean ports of France; the trade was with the western ports. The first mention of the Hessian Fly in Canada in the chronological table of the Professor is 1805. The troops were sent by the way of Brest. To be sure of the facts I applied to the best authority, Mr. Fr. Parkman, who has kindly confirmed in a note the above given statements.

The fourth conclusion (p. 238) of the Professor reads as follows: "That it (Hess. Fly) has *from time immemorial* been an inhabitant of wheat fields on the shores of the Mediterranean, in Spain, at Toulon in France, at Naples, in Minorca and Asia Minor."

It should have been remarked that the statement *from time immemorial* in Mr. Dana's report applies *only* to Minorca and Spain. Such statements by agriculturists or peasants are to be taken for what they are worth, if not corroborated by reliable published reports. After all it is obvious that this statement states too much. The experience of a century has shown that the Hessian Fly has nowhere been from time immemorial the inhabitant of the same spot.

Concerning France, the letter of Mr. Broussonet (Encycl. Britan. and Parliamentary Report) proves directly that no mischief was done considerable enough to attract the attention of the Government. The specimens collected by Mr. Dana at Toulon are the only ones known from this part of France.

Concerning Italy, I know nothing except the few specimens collected near Naples by Mr. Dana; but I have taken steps to receive direct statements from Italy as well as from Spain. I have not yet been able to compare the two Italian publications quoted in the report of Sir Joseph Banks. The quotation of Asia Minor should have contained that Prof. Loew had not seen the fly, but had collected near the shore a larva and pupa on the straw, later recognized by him as identical with his *Cec. secalina*.

I believe that the value of the Professor's fourth conclusion is rather doubtful after the statements just given, and the value of the fifth conclusion, "that it probably originated in this (Mediterranean) region or farther east, the probable original habitat of the wheat and other cereals," is nothing more than a supposition of B. Wagner. But the statement that these cereals still live wild in Persia is not proved at all, and certainly neither the fly nor any record about any mischief done by it in the Orient has been found.

The sixth conclusion (p. 238) of the Professor is also an adoption of B. Wagner's views: "That it was introduced from Southern Europe, either Southern France or Mediterranean regions, perhaps Asia Minor, before the Revolutionary War." But Wagner speaks with more reserve and caution. Having felt the strength of the objections to an introduction of the insect by a longer voyage, he supposes that importation had been possible only from the nearest coast of France. But his assumption of the long-existing occurrence of the insect in Southern France is not corroborated by any fact whatsoever, beyond the few specimens found in 1834 by Mr. Dana near Toulon. Whether a large trade between the Mediterranean shores and North America existed before the Revolution, or not, I am unable to state. But some very interesting facts out of the memorandum book of his father, communicated by the late Mr. N. Silsbee, show that immediately after the Revolution an active trade from Salem, Mass., to Leghorn and other Italian cities, was kept up, principally bringing over American meal. It may therefore be supposed that this trade was not an entirely new feature, at least it was spoken of as a well known fact. Had not the difficulty, or perhaps better, the impossibility, of introducing the insect by trade been proved by the immense trade during all this time with England, where by the greatest care and attention the insect was never observed in the cargoes, it could have been assumed that the fly had been introduced just by American trade to all the places visited by Mr. Dana. At least there was the same chance for an introduction from Europe to America, as from America to Europe. Nevertheless just this difficulty makes it more plausible that the insect was indigenous here as well as in the Old World, a statement so well expressed a century ago by Dr. Mitchell (Encycl. Britan., p. 494).

The Memoirs of the Philad. Soc. for Promoting Agriculture, contain in Vol. IV., 1818, p. xxix., Notes for a Young Farmer, etc., by Richard Peters, President of the Soc.:

It is not yet agreed what kind of wheats best withstand the Hessian Fly. . . Good farming, manure and reasonably late sowing are certainly the best securities. It is most probably a native here. It never entirely leaves us, though it appears at irregular periods in numbers less scourging than at times when its ravages are more conspicuously destructive. [Here follows the passage concerning its name, as quoted before; and p. lii., a note of Say's description of the fly and its parasites.]

P. xl., Address on the Progress of Agriculture, January 14, 1817, by James Mease, M. D., Vice-President.

Wheat, barley and oats have been as productive as common, except where the first named grain was much injured by its old enemy, the insect absurdly called Hessian Fly; another proof that a cold winter has no influence in destroying that pest.

Further, in communications in consequence of the request of the Society, on the circumstances attending the season of 1816.

P. 200, Joseph Gibbons: Hessian Fly locally in Springfield.

Delaware Co.: Note by R. Peters.

P. 204, Henry Cox, London Grove, Pa.: Hessian Fly undisturbed.

P. 211, Richard J. Jones, Kinnerely, Md.: H. Fly very destructive.

P. 216, R. K. Meade, Virginia: H. Fly present.

[All these data are wanting in the chronological table.]

P. 224-226, a letter by Th. Say containing remarks on the H. Fly.

P. 236-237, a letter by Th. Say containing remarks on the H. Fly.

Vol. V., 1826:

P. 135-137. On the Hessian Fly, by John Linton, April 30, 1821. Description of a simple machine to brush the field with a branch of a tree to destroy the H. Fly.

A note on p. iv. of the contents states: "The implement mentioned by Mr. Linton has not been found to answer the purpose intended by it."

P. 143-153. Some Observations on the Hessian Fly; written in the year 1797 by Dr. Isaac Chapman; read August 14, 1820; at the end a note by Dr. M. (probably Mease).

This paper is one of the most important, based upon personal observations from 1786 to 1797. It has been used by Harris. The note at the end states that after the observations of Mr. Worth, there are certainly three annual generations instead of two, as stated by Mr. Chapman. Chapman's paper should be quoted as belonging to the literature of 1826.

An anonymous article, "The Hessian Fly," in the *Albany Gazette* of June, 1799, is reprinted in the *Agricultural Museum* (by D. Wiley), Georgetown, Ca., 1811, vol. 1, p. 39.

Memoirs of the Board of Agriculture of the St. of New York, Albany, 1821, vol. i., contains:

Featherstonaugh, G. W. An essay on the principles and practice of rural economy; chap. ix., metamorphoses of insects, p. 170, gives a short account of the Hessian Fly, "which has now greatly abated."

P. 62, a letter from Exc. George Washington, Mount Vernon, 15th July, 1797.

Our crop of wheat this year will be very short, owing to three causes, . . . and which is more to be regretted, to what with us is denominated the Hessian Fly, which has spread devastation more or less in all quarters.

[This year is wanting in the chronological table.]

Matth. Carey, *American Museum*, contains many communications and is largely used by A. Fitch. Nearly all authors quoted to 1792 are reprinted in full in the *American Museum*.

A premium was proposed by the Philad. Soc. for Prom. Agriculture for 1788 (Carey, vol. iii., p. 176):

"8. For the best information, the result of actual experience, for preventing damage to crops by insects, especially the Hessian Fly, the Wheat Fly, or Fly Weevil, the Pea Bug, and the Corn Chinch-bug or Fly—a gold medal; a silver medal for the second best."

The same premium was offered for 1789 (Carey, vol. v., p. 159), for 1790 (Carey, vol. vii., p. 271) and for 1791 (Carey, vol. ix, p. 170). But I find nowhere mentioned that the premium was awarded.

The remarkable, not to say extraordinary circumstance, that the excitement during the Revolution led to entire forgetfulness of the former presence of the Hessian Fly, makes it, as I believe, more important to follow up as carefully as possible the literature before and after the Revolution. I will be indeed very much indebted for the communication of every fact not yet recorded.

A. A. A. S.

The next meeting of the A. A. A. S. will be held at Ann Arbor, Mich., commencing Aug. 26th, 1885. The Entomological Club will meet at that place on August 25th, 1885, according to its by-laws; exact locality not yet determined.

Will those members of the Club, or other Entomologists, who expect to be present, please notify one of the undersigned, and also send in the title of any papers they expect to read, and state the length of time they expect to occupy, so that a programme can be arranged? The exact place and hour of meeting, as well as the programme so far as fixed, will be published later.

Committee: JOHN B. SMITH, Brooklyn, N. Y., Chairman; HERBERT OSBORN, Ames, Ia.; B. PICKMAN MANN, Washington, D. C.

NEW LIST OF THE NORTH AMERICAN DAGGER MOTHS.

BY AUG. R. GROTE, A. M., BREMEN, GERMANY.

The name "Dagger Moths" is given to a group of white and gray Noctuidæ, or Owlet Moths, which, in the perfect state, possess a certain similarity in appearance, but are often quite dissimilar as caterpillars, not only among themselves, but as compared with the other Noctuidæ, with which Family they are classified. The name itself alludes to a black mark which many of the species show near the internal angle of the fore wings, which resembles a dagger, or the Greek letter *Psi*. The caterpillars are often ornamented with curious hairs or bristles; several are shaggy in appearance, so that they look like *Arctiadæ* or *Dasychiræ*. This peculiarity is shared, however, by other genera such as *Platycerura* and *Charadra*, which I classify with them as a subordinate Group of the Noctuidæ under the name of *Bombycoidæ*, or perhaps more properly, *Apatelinæ*.

The use of the generic name *Apatela* is sanctioned by Stephens, in every way a most excellent authority in this group of moths. It is first used by Hübner in his Tentamen, with the type *Auricoma*, and in a strict sense it must be retained for that section of the genus to which this species belongs. I refer to the Preface of the first part of my first Check List of the Noctuidæ for the grounds on which I use certain of Hübner's generic names. Also to a recent article of mine in "Papilio," wherein I show under what limitations I am now constrained to admit the validity of this author's generic titles. Harris uses *Apatela* for his species *Americana*, but this is not strictly congeneric with *Auricoma*, but falls under a distinct section which I have called *Megacronycta*. As a whole, the Dagger Moths have simple antennæ, the palpi are short with small third article and shortly haired. The eyes are naked; the body usually untufted on the dorsum; the legs unarmed. The hairy larvæ, somewhat arctiiform, construct a rather tough cocoon and usually appear in the spring as moths. Some species appear to be double brooded, others only so in the South. The limits of the genus are perhaps really overstepped in the case of the Californian species referred to the section *Merolonche*, and perhaps again with regard to the Eastern *Oblinita* and allies, the section *Eulonche*. Almost all of the writers who have written on our moths have given more or less attention to this interesting genus. Mr. Saunders was the first to

discover the larva of *occidentalis;* under the name of *Populi* Prof. Riley has given us a description and drawing of the larva of *lepusculina;* but perhaps more work with the best results has been performed by Mr. Roland Thaxter, who has proved himself a most conscientious student and kind personal friend to me. The present list supplements my former lists, the last of which is contained in "Papilio," and corrects certain inaccuracies which crept into them.

Genus APATELA Hübn.

Subgenus *Triaena* Hübn.

Type: A. Psi.

1. Occidentalis *G. & R.* "Western Dagger." Larva on apple and elm, (Saunders, Thaxter).
2. Morula *G. & R.* "Ochre Dagger." Larva on apple and elm, (Thaxter).
3. Lobeliæ *Guen.* "Large Dagger." Larva on burr oak, (Coquillet).
4. Hasta *Guen.* "Smoky Dagger."
5. Furcifera *Guen.* "Forked Dagger." Larva on wild cherry, (Thaxter).
6. Thoracica *Gr.*
7. Dentata *Gr.*
8. Grisea *Walk.* "Pale Dagger."
   Pudorata Morr.
9. Tritona *Hübn.* "Brown Dagger."
10. Falcula *Gr.* "Edged Dagger." Larva on hazel, (Coquillet).
11. Parallela *Gr.*

§

12. Albarufa *Gr.* "Red and White Dagger."
    Walkeri And.

§

13. Paupercula *Gr.* "Small Dagger."
14. Vinnula *Gr.* "Olive Dagger." Larva on elm, (Thaxter).

§

15. Quadrata *Gr.* "Square Dagger." Larva (Dodge).
16. Clarescens *Guen.* "Clear Dagger." Larva on wild cherry, apple, (Thaxter).
17. Harveyana *Gr.* "Harvey's Dagger."
18. Radcliffei *Harvey.* "Radcliffe's Dagger." Larva on wild cherry, apple, (Thaxter).
19. Tota *Gr.*

Subgenus *Acronicta* Ochs.

Type: A. Leporina.

20. Lepusculina *Guen.* "Poplar Dagger." Larva on poplar, (Riley).
Populi Riley.
21. Felina *Gr.* (an sp. præc.?) Larva on poplar, (Edwards).
22. Vulpina *Gr.* "Birch Dagger." Larva on birch, (Thaxter).
§
23. Innotata *Guen.* "Graef's Dagger."
Graefii Gr.

Subgenus *Megacronycta* Gr.

Type: A. Americana.

24. Americana *Harris.* "American Dagger." Larva on oak, (Coquillet); also on maple, walnut, ash (Thaxter).
25. Dactylina *Gr.* "Fingered Dagger." Larva on alder and willow, (Thaxter).
26. Insita *Walk.*

Subgenus *Merolonche* Gr.

Type: A. Spinea.

27. Spinea *Gr.* "Spiny Dagger." Larva (Edwards).
28. Lupini *Gr.* "Lupin Dagger." Larva (Edwards).

Subgenus *Apatela* Hübn.

Type: A. Auricoma.

29. Brumosa *Guen.* "Verrill's Dagger." Larva on birch, willow, poplar, (Thaxter).
Verrillii Gr.
Fasciata Walk.
Impressa Walk.
30. Distans *Gr.*
31. Rubricoma *Guen.* "Red Dagger."
32. Luteicoma *Guen.* MS. Gr. "Plain Dagger." Larva on linden, ash, maple, cherry, apple, etc. (Thaxter).
33. Subochrea *Gr.* "Bright Dagger."
34. Perdita *Gr.*
35. Afflicta *Gr.* "Dark Dagger." Larva on oak, (Thaxter).
36. Noctivaga *Gr.* "Black Dagger." Larva on poplar, (Thaxter).
37. Superans *Guen.* Larva on plum and hazel, (Saunders).
38. Connecta *Gr.*

Subgenus *Jocheaera* Hübn.

Type: A. Alni.

39. Funeralis *G. & R.* "Odd Dagger." Larva on hickory, (Thaxter).

Subgenus *Lepitoreuma* Gr.

Type: A. Hamamelis.

40. Ovata *Gr.* "Oval Dagger."
41. Exilis *Gr.*
42. Hamamelis *Guen.* "Hazel Dagger." Larva on chestnut, oak, (Goodell, Thaxter).
43. Haesitata *Gr.*
44. Increta *Morr.*
45. Dissecta *G. & R.* "Frail Dagger." The flimsiest, smallest species.

Subgenus *Arctomyscis* Hübn.

Type: A. Euphrasiæ.

46. Sperata *Gr.*

Subgenus *Mastiphanes* Gr.

Type: A. Xyliniformis.

47. Xyliniformis *Guen.* "Sleepy Dagger." Larva on birch, blackberry, (Thaxter).
48. Pallidicoma *Gr.*
49. Extricata *Gr.*
50. Edolata *Gr.*
51. Lithospila *Gr.* "Streaked Dagger."

Subgenus *Eulonche* Gr.

Type: A. Oblinita.

52. Oblinita *A. & S.* "Smeared Dagger." Larva on button bush, etc. (Thaxter). Strawberry, poplar, (Saunders).
53. Lanceolaria *Gr.* "Pointed Dagger." Larva on plantain, etc. (Thaxter).
54. Insolita *Gr.* "Rare Dagger."

Desiderata.

A. Spinigera *Guen.*
A. Telum *Guen.*
A. Interrupta *Guen.*
A. Longa *Guen.*
A. Ulmi *Harr.* Corr.
A. Pruni *Harr.* Corr.
A. Salicis *Harr.* Corr.

A. Aceris *Abb. & Sm.*

A. Hastulifera *Abb. & Sm.*

These species have not been identified satisfactorily by me. Harris' species are posthumous and founded on the larvæ alone. They cannot in any event disturb the synonymy of species described before Mr. Scudder's publication of Harris' Entomological Correspondence. For Abbot & Smith's *Aceris* the name *Acericola* has been proposed by Gueneé. If *Aceris* A. & S. is *Americana*, which I doubt, then both *Aceris* and *Acericola* fall away before *Americana* of Harris. The North American species of *Apatela* outnumber the European in the proportion of three to one.

DESCRIPTION OF MATURE LARVA AND CHRYSALIS OF NISONIADES ICELUS, Lintner.

BY W. H. EDWARDS, COALBURGH, W. VA.

On 20th June, 1884, I found on edge of leaf of an Aspen, P. tremuloides, a young larva of species of Nisoniades unknown. A small bit of the leaf was cut on two sides perpendicular to the edge, folded over and stitched down. At a little distance from this shelter a hole was eaten in the leaf. Two days later the hole was enlarged and the larva evidently had left its nest and returned to it after feeding. On 27th June one moult was passed, supposed to be the first; on 5th July a second; on 16th July a third. This was the last moult, but I am not sure that one did not take place between the 5th and 16th. It is probable there were four moults, as *N. Lucilius* is reported by Prof. Lintner to moult four times. The larva was kept in a jelly glass, and being always concealed in a leaf, a moult might have escaped me. On 20th July, or 4 days after last moult, the description was as follows:—

MATURE LARVA.—Length $\frac{64}{100}$, greatest breadth (in middle) $\frac{16}{100}$ inch; obese, tapering either way from middle, the dorsum elevated and sloping towards 2 and 13 about equally; color gray-green, caused by fine whitish granulations on a pale green surface; over all the dorsal region a yellowish tint; a mid-dorsal dark line from 4 to 12; a sub-dorsal white stripe on either side; no other markings; segment 2 yellow (no black on this segment); whole upper surface covered by a fine gray down; head sub-cordate, deeply depressed, broader than high; color all light red-brown; the surface granulated, and covered with a fine down; the ocelli red-brown on a black demi-stripe.

On 30th July, the length was $\frac{72}{100}$, breadth $\frac{18}{100}$ inch; but excepting in increased stoutness, the appearance was just as described.

Before 30th July this larva had stopped feeding, and I expected pupation daily. But after a week or two of this, it seemed probable hibernation had set in, and I placed it in the cellar. At intervals I examined it and found it had not moved. On 19th Sept. I sent this larva with many others to Clifton Springs, New York, to be placed in the "cooler" of the Sanitarium, where the temp. all the year is kept at about 40° Fahr.

On 7th March, 1885, I received all the larvæ from Clifton. The Nisoniades was in a small paper box, and after it had left me (19th Sept.) it had stitched the paper cone it rested in by one end to the side of the box. The cone was laid loosely in the box when I sent it away, and came back fastened to the side, showing that at some time the larva had been sufficiently active to make its nest secure. This larva eat nothing after hibernation, and there was no evidence that it ever left its cone, but as I had frequently to break the threads that closed the cone in order to keep watch on the inhabitant, and always found the edges closed again, it was evident that the larva was not always soundly sleeping. On night of 27–28 April pupation took place.

DESCRIPTION OF CHRYSALIS.—Length $\frac{53}{100}$ inch; breadth across mesonotum $\frac{14}{100}$, across abdomen $\frac{16}{100}$ inch; cylindrical, the abdomen conical; head case produced, rounded, and bent down, i. e., towards ventral side; mesonotum broad, rather high, rounded, not carinated; followed by a shallow excavation which is continued across the wing cases; surface smooth; color of head case reddish-brown; of wing cases less red, more brown, with a greenish tint; of mesonotum more yellow; of abdomen pale flesh color; the cremaster straight, small and short, fastened to support by a tuft of white silk; the surface of this chrysalis is covered by a fine short down, and about the head case are scattered short hairs.

The imago came forth 13th May, *N. Icelus*. To make sure of the species, I submitted it to Prof. Lintner. The description of the mature larva will answer as to color and markings for all the stages after first moult. The Aspen was brought from the Catskill Mts. I have formerly in one instance had the same larva here from English Filbert, but the imago failed to appear.

Very little seems to be known of the preparatory stages of the American species of this genus. Prof. Fernald says, But. Maine, of *N. Brizo*, "The

larva is said to feed on oak and Cynoglossum Morisoni." Of *Persius*, "The larva, according to Scudder, feeds on willow, poplar and Lespedeza capitata." Of *Icelus*, "The early stages of this common species are not known." Mr. Scudder gives the food plants of three species, in "Butterflies." On p. 114 we read: "The caterpillars hibernate full fed, and only change to chrysalis as winter's icy bonds begin to break," and on same page is given a cut of larva and chrysalis of *N. Ennius*, a species unknown to me, and so far as I am aware, undescribed. Dr. Harris describes the caterpillar of *Juvenalis* as if he had seen it, but the chrysalis from one of Abbot's figures, and says: "Mr. Abbot informs us that in summer the skipper leaves the chrysalis in nine days, but the autumnal brood continues in the chrysalis state throughout the winter." For *Brizo*, he refers to Boisduval and LeConte's figures of caterpillar and chrysalis, and these are copied after Abbot. Abbot says of *Juvenalis*: "One of them spun itself up July 26th, changed 27th, and came out Aug. 5th. Some that enclosed themselves in Sept. and Oct. did not come out till the 22nd of March following." Abbot, in Ins. Ga., figures no Nisoniades but *Juvenalis*. His larvæ behaved very differently from this of *Icelus*, or from the account given by Mr. Scudder. By the time *Icelus* was hibernating, the *Juvenalis* had pupated, and the late brood, Sept. and Oct., Abbot says, pupated and passed the winter in chrysalis.

The only satisfactory description of a Nisoniades caterpillar published is that of *Lucilius* by Prof. Lintner, Ent. Cont., 4, 67. He in fact describes all stages, egg, four moults and chrysalis. His larva fed on Aquilegia Canadensis, pupated 6th August, and the imago came out 12th August. Two other larvæ pupated 8th and 9th August, and both gave butterflies on 15th of same month. Mr. Lintner says that there are two annual broods of the butterfly, and possibly a third. So far as I know, the references to the life-history of our Nisoniades above given embrace everything that has been published.

The behavior of *Icelus* is therefore peculiar to itself so far as anything is known of the genus in this country; the larva going into lethargy so early in the season, the last of July, and that when fully mature and when pupation might naturally be expected; spending eight months in that condition, eating nothing in the spring, but pupating several weeks after mild weather had come. There might have been an earlier brood than the one of July, but probably there was no later one, and the two, if there be two, must be the limit.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., JUNE, 1885. No. 6

ENTOMOLOGICAL EXHIBITS AT THE NEW ORLEANS EXPOSITION.

BY THE EDITOR.

The United States Government exhibit, and those of several of the States, at the New Orleans Exposition, included many features of interest to the Entomologist. The Entomological Bureau of the Department of Agriculture had a very fine display illustrating Economic Entomology, which was brought together and arranged under the direction of Prof. Riley, and was not only interesting, but very instructive.

The first thing that caught the eye of the visitor on entering this section was a series of large diagrams on cotton, illustrating the life history of a number of injurious insects, such as the Plum Curculio, *Conotrachelus nenuphar*, and its parasites; the Chinch Bug, *Micropus leucopterus;* the Jumping Sumach Beetle, *Blepharida rhois;* the Boll Worm, *Heliothis armigera;* the Round-headed and Flat-headed Apple-tree Borers, *Saperda candida* and *Chrysobothris femorata;* the Codling Moth, *Carpocapsa pomonella;* the Peach Borer, *Aegeria exitiosa;* the Grape Phylloxera, *Phylloxera vastatrix*, and a large number of other well-known injurious species. The insects themselves were arranged in cases near by, and grouped so as to show those injurious to the apple, pear, peach, orange, strawberry, raspberry, currant, gooseberry, melon, cranberry, persimmon, grape, sugar cane, hop, rice, Indian corn, small grains, cotton, grass, clover, pea, bean, cabbage, potato, tomato, tobacco, asparagus and onion. Many of these groups were very complete, having along with the perfect insects the pupæ and blown larvæ, with specimens of the articles injured, also the friendly insects which aid in subduing those which are injurious.

There was a very interesting section relating to bees and bee-culture, including all sorts of hives and apparatus, specimens of the different races of bees, with dried specimens of the plants and flowers from which honey is chiefly extracted.

A large department was filled with every kind of spray apparatus for

applying liquid poisons to growing crops for the purpose of destroying injurious insects.

The silk exhibit was also very instructive, showing this substance in all stages of manufacture from various species of silk worms, including some of our natives.

A very complete catalogue of the exhibit had been prepared, covering 95 pages 8vo., which was freely distributed to those specially interested in the subject.

In the Florida exhibit there was one case of insects containing a number of butterflies and beetles, including some beautiful Papilios, the only familiar species being *cresphontes*. There were no names to the specimens, and nothing to indicate who they were collected by.

North Carolina shows four cases of insects without names, including some very handsome species of Lepidoptera, Coleoptera and Neuroptera.

In the Texas department there was a gorgeous display, the collection of L. Heiligbrodt, of Bastrop, Bastrop Co., Texas, consisting of twelve cases of Coleoptera and twelve of Lepidoptera, classified and named, including some of the most brilliant and perfect specimens ever seen by the writer, with wonderful metallic lustre. Mr. H. also exhibited forty-three cases of European insects.

The State of Mississippi shows one case of insects fancifully arranged, collected by Miss P. Crump, including all orders, among them some rare and interesting butterflies.

In the Maryland exhibit, Mr. E. Louis Graf, of Baltimore, has a very singular looking display consisting of several cases of insects with the specimens arranged in fanciful designs and representing objects such as the American eagle, etc.

In the woman's department there was a collection of galls by Miss Cora H. Clarke, of Boston, in eight cases; also a series of excellent drawings of insects and parts of insects by Mrs. A. B. Comstock.

Among the exhibits from Japan there were quite a number of insects shown by the educational department, consisting of four cases of Lepidoptera, including some very beautiful diurnals and handsome moths. The only familiar butterfly here was that cosmopolitan species, the Painted Lady, *Pyrameis cardui*. There were two cases also of Coleoptera, containing some handsome longicorns, one case each of Neuroptera, Hemiptera and Orthoptera, and one of mixed Hymenoptera and Diptera.

In addition to these there were two large cases where the specimens

were grouped so as to show those injurious and those beneficial to agriculture.

There were probably other collections of insects in the buildings, but there being no official catalogue to guide the visitor, there was great difficulty in finding them.

REMARKS ON SOME SPECIES OF COLEOPTERA, WITH SUPPLEMENTARY DESCRIPTIONS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Many of the species of Coleoptera have been described from single, or, at the most, two or three specimens; these often imperfect, immature, or with individual peculiarities. Owing to this, those who undertake to determine their insects by descriptions, even allowing a wide latitude of interpretation, are frequently in doubt and uncertainty. Where families and genera have passed through recent monographic review, the re-description of the species from better preserved or more abundant material usually obviates the difficulty, but enough still remain to give trouble.

Among these, the ones here introduced seem deserving of notice, as some further description is necessary for their identification without having recourse to friendly aid.

Toxotus Schaumii Lec. The first difficulty is the feebleness of an important generic character; to be a Toxotus the eyes must be emarginate, and they are so obsoletely so in the few individuals of this species that have come under my observation as to make this character opinionative. There are two forms of this species so unlike in color, that unless taken in close relation, they would scarcely be recognized as belonging to the same species.

When Dr. LeConte described this species (Jour. Acad. Nat. Sci., Phil., 2d series, vol. 1, p. 320), he seems to have only known one of these forms, characterizing it as "black, with whitish pubescence, legs black, femora yellowish, with base and tip black." This seems to apply to both sexes. And if the specimen in hand is of this color and recognized as a Toxotus, there is no further trouble. But should the specimen be reddish yellow, with black elytra so closely clothed with whitish grey pubescence as to conceal the color, antennæ black, with yellow basal joint, and tarsi piceous,

the diagnosis might be incorrect and induce the collector, were he ambitious in that direction, to add another synonym.

It is true, Dr. LeConte mentions, in a two-line notice, that this is a male form (Proc. Acad. Nat. Sci., 1862, p. 41); but, as the volume is not indexed, unless stumbled on accidentally the reference would escape notice. This appears to be a rare Cerambyan, and among the choicer. The specimen taken here was of the last mentioned form, being in length 1.20 inch. Heretofore it seems to have occurred only in Ohio, (LeConte, Dury).

Leptura vibex Newm. A color variety of this caused me some trouble, notice of which, if any, has escaped my attention. Dr. Horn described the species under the name *nitidicollis*, giving a fine colored figure (Proc. Acad. Nat. Sci., Phil., 1860, p. 570 and plate 8). Normally it is black, with the mouth parts and a narrow marginal and medium stripe (subject to variation) yellowish; legs rufous; femora with the distal end black, or not. This describes the form found here. The other form previously alluded to corresponds also with this description, except that the thorax is entirely yellow. I took it in Ohio, forty miles westward from here, but did not find the other form there, so that perhaps it is a local race. The species appears to be distributed from Northern Michigan through Canada and southward to Virginia. The variation in the extent of the elytral stripes is considerable; in some individuals the marginal one is obsolete and the dorsal reduced to a mere line; in others they are dilated so as to leave only a narrow sutural and lateral stripe black; and some may possibly be found with the elytra entirely black, or entirely yellow.

Rhinoncus longulus Lec. is common and very abundant, occurring from Florida to Michigan, and also in California (LeConte.) Here it feeds exclusively on Polygonum virginicum Lin., a plant growing in open woodlands, the leaves of which it perforates. Its season of greatest abundance is late in June, but it may be found sparingly till September. Though so common, it does not seem to be well recognized, no insect being oftener given in exchange. This is probably because the description (Rhyncoph. N. A., p. 284) only applies to rubbed or alcoholic specimens, omitting much of the vestiture as met with in life. In addition to Dr. LeConte's description—"thinly clothed with small white scales; more dense, forming a short posterior-dorsal line on the prothorax, and an elongate sutural spot at the base of the elytra"—there is also an elon-

gate sutural spot extending from the middle till near the apex, the anterior and posterior extremities of which are more or less connected with arcuate transverse lines extending to the margin, enclosing on each elytron a black spot nearly destitute of white scales; the humeri are also similarly encircled; the sides of the thorax and abdomen are likewise moderately densely clothed with white scales; the striæ are deep, wide and coarsely punctured, with narrow rugose intervals. When first taken the insect has a very pruinose appearance, but rough handling or immersion in alcohol removes nearly all the scales, except the basal spot.

Piazorhinus pictus Lec. is not very common. I have taken three specimens and have seen three others. It probably lives on Ostrya Virginica (known here as Iron-wood). It is excessively variable in the color and ornamentation of its vestiture, no two of the six examples being alike, and only one of them approximating that of the type. Dr. LeConte described the species (Monograph Rhyncoph.) from a single insect taken in Georgia, as "Testaceous, clothed with pale yellowish pubescence; head and beak dusky. Elytra with a large, rounded, common, dusky spot, extending from the base to the middle, paler within; and a dusky, oblique band more or less interrupted on the seventh interspace, which attains the suture about one-fourth from the tip." Of those I have seen, one has the beak and head leonine yellow, like the thorax; the elytra being of the same color, mottled uniformly with brown; another has the beak, head and thorax typical, but the elytra are dusky brown with a streak along the external margins and an irregular fascia near the apex, tawny yellow; another has the beak and head typical, but the thorax has a dark spot in front of the scutellum and there is a small dark spot on each elytron near the middle. The others are still differently ornamented and need not be described, as the above shows sufficiently the variableness of the species in this respect. This species is likely to prove difficult for the collector to determine so long as he has the description of only one insect to refer to, and perhaps only about one in ten of his insects agreeing with it. This is one of the many cases that goes to show that, unless to meet urgent systematic requirements, it would give better results and prevent much confusion to await the accumulation of several specimens before attempting to describe a species.

Among the errors that have become widespread in exchanges it may be of advantage to notice the following:

Microclytus gazellula Hald. has lately appeared on several exchange

lists, but in every instance (four) the specimens sent me were *Cyrtophorus verrucosus* Oliv. The descriptions of *C. gazellula* Hald. and of *Cyrtophorus gibbulus* Lec. (Lake Sup. p. 234 now united with it), show the color and markings to vary greatly individually, and to so closely approximate *C. verrucosus* as to be doubtfully distinguishable, and the separation must be made by reference to generic characters. In *Microclytus* the second joint of the antennæ is as long as the fourth; while in *Cyrtophorus* the second joint is short, and the third is longer than the fourth, (Class. Coleopt.) No weight should be attached to color or markings for the separation of these two species.

Anthonomus cratægi Walsh, which is common and abundant on many kinds of blossoms, especially wild cherry and laurel, is always sent me for *A. rubidus* Lec., which species I have not yet obtained. There should not be much trouble in distinguishing them, as *cratægi* has only six joints in the funicle of the antenna, while *rubidus* has seven—a matter readily determined by counting them under a microscope.

Elater protervus Lec. has been united with *semicinctus* Rand. and *Cryptobium latebricola* Nord. with *pallipes* Grav., both of which have always been troublesome to collectors.

There are many other names on the list that deserve the same treatment, and will, no doubt, eventually be united as the variations in color, size and sculpture within specific limits become better known.

SEASIDE CAPTURES.

BY FREDERICK CLARKSON, NEW YORK CITY.

I visited Fire Island, Rockaway Beach, Long Beach and Coney Island during the seasons of 1883 and 1884. Found myriads of *Cicindela hirticollis* and *dorsalis*, Say. The beaches were fairly alive with these beetles. The *hirticollis* were most abundant in the latter part of June and early part of July, and *dorsalis* at the end of July and beginning of August. These beetles may be found throughout the length of these beaches. They have a singular habit of collecting in great numbers at certain points, where in spaces of about fifty feet square they are as numerous as flies about a stable. This was frequently observed, and so far as the general character of the beach and the surroundings were con-

cerned there was nothing to favor the particular locality. My activity and success in taking these interesting hexapods at the seaside excited on many occasions the curiosity of some equally interesting bipeds, who, barefooted and wading through the surf, doubtless ridiculed my energy and thought me mad.

> "Let Hercules himself do what he may,
> The cat will mew, the dog will have his day."

At the last of spring and in the early summer, *Calosoma scrutator* Fabr. can be found at these beaches. The past seasons, however, gave me but few specimens. *Doryphora decem-lineata* lined the shore during both summers, having been developed in great numbers in the many potato fields of this island-garden of New York. *Cotalpa lanigera* Linn. and *P. humeralis* Fabr. were found during the month of June among the sea weed; the former readily discovered by its brilliant coloring of green and yellow, and the latter by its scarlet spot in a setting of dull blue. A wrecked *bark* furnished me with good specimens of *Necrophorus Americanus* Oliv. and other genera of the Silphidæ family, together with an occasional unpleasant reminder of the dog that had had his day. Of the tribe Cetoniini only a few specimens were obtained; *Euryomia fulgida* in June, *Allhorina nitida* in July, and *E. inda* at the last of summer. *Harpalus caliginosus* Say was captured in September hid away in the drift at the tide mark. Of this species I would note here the suddenness of its appearance in Columbia county, this State, in the autumn of 1882. In the early part of September I found a single specimen under a stone. On the 13th, a dark and misty day, I captured twenty, and could have taken hundreds feeding upon the seed tops of a common weed, *Ambrosia artemisiæfolia*. The day before and for several days thereafter until the 27th, when I returned to town, only an occasional one was seen. Among the treasures of the beach I collected several shells, perforated in every part by the young of one of the lower order of Crustaceans, and rendered immaculate by the washings of the tide and the sun's rays. The minute winding galleries, not larger than pin holes, displayed exquisite workmanship, resembling the most delicate lace. The mouth parts of these Sea Worms, or Barnacles, are strong and corneous, and are capable of excavating galleries in the hardest substances. I have in my collection a portion of a slab of white Italian marble, recovered in 1878 from the wreck of the ship Grecian, from Leghorn, that foundered off the coast of Long Island

twenty years previous. The specimen measures four by six inches, has a thickness of one inch, and is so thoroughly honeycombed by these Crustaceans as to have reduced its original weight nearly one-half.

MISCELLANEOUS NOTES ON BUTTERFLIES, HABITS OF LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, W. VA.

MELITÆA HARRISII, Scud.

I described the stages of this species in CAN. ENT., ix., 165, 1877. In fall of 1883, I received several larvæ from Mr. Chas. Fish, of Brunswick, Me., which were carried through the winter in ice house. They were brought into a warm room 29th April, 1884, and 1st May, began to feed, the plant being wild Aster. On 4th May, some were passing the fourth moult, and these reached fifth moult 10th May. The first larva suspended 17th, pupated 18th, and the imago appeared eight days thereafter, or on 26th May. All the larval stages, however, were irregular. One larva passed fifth moult 19th May, but did not pupate till 1st June. On 7th June, '84, I received from Mr. Fish about 20 larvæ in last two stages, and on 9th about 50 more. Some were in third stage from pupa, or between 2nd and 3rd moult. The species evidently hibernates after both 2nd and 3rd moult, as *M. Phaeton* does. Mr. Fish wrote that all were taken on Dipoplappus, and says: "I found them sometimes 4 or 5 on a plant, always on the upper side of the leaf in the most conspicuous position. I have never found them making any attempt at concealment." Prof. Fernald also says, But. Maine, that they make no web over their food-plant.

MELITAEA PHAETON, Drury.

I related in Papilio, iv., 69, 1884, how *Phaeton* had come to be exterminated in this region, by reason of a flood in the Kanawha River, in 1878, which covered the river bottoms to a depth of several feet in many places, and especially in the swamp where I formerly used to find the larvæ, as related in But. N. A., Vol. II. The swamp was under ten feet of water for two days after the larvæ had closed their webs for hibernation, in August. For several years I had seen neither larva nor butterfly. I had near my house, on high ground, a plant of Chelone glabra, which

years before had been brought from this swamp in order to have food convenient when I might have larvæ of *Phaeton*, and 25th June, 1883, a knot of twisted leaf enclosing eggs of *Phaeton* was found on this plant. Some straying butterfly had found the plant and laid a large cluster of eggs on it. The larvæ from these were carried through the winter, about 60 of them, and I determined to re-people the swamp. On 29th April, '84, I had searched it for larvæ, but found none. On 22nd May thereafter, I turned loose 2 ♂ 6 ♀, and 1st June, 12 ♂ 3 ♀. On 17th July, I visited the swamp again and soon found five webs, with hundreds of caterpillars. Mr. C. Troxley, of Louisville, Ky., wrote me that he had taken *Phaeton* feeding on Mimulus ringens, a plant not before recorded. Miss E. L. Morton, of Newburgh, N. Y., has fed the larvæ in confinement on the narrow-leaved Plantain. The other plants known are Chelone glabra, Gerardia pediculata, Lonicera ciliata and Viburnum dentatum.

Colias Eurydice, Bois.

I raised a brood of larvæ of this species in 1884, from eggs sent by Mr. W. G. Wright, San Bernardino, on Amorpha Californica. I have several of these plants growing in my garden, sent by Mr. Wright, and by covering them in winter, or moving them to the cellar, they do well here. I described the stages of *Eurydice* in Can. Ent., xv., 224, 1883, and then stated that there was no generic difference between the larva, eggs or chrysalis of this species and *Philodice*, belonging to Group 2. There seemed however to be a difference in the food-plants of the two groups, *Philodice* and *Eurytheme* feeding on Clover and Astragalus, the other on a shrub. But I separated part of the *Eurydice* larvæ in '84, giving them white clover, and though they at first seemed unwilling to eat it, they did become used to it and went to pupation on it.

The *Eurydice* butterflies that I have had or have received from Southern California are nearly all quite different from those taken about San Francisco, inasmuch as the disk to base of fore wing is not violet-pink, but yellow. Some have a little changeable lustre, but most have simple yellow.

Victorina Stelenes, Linn.

I have recently received a fine male of this species, taken March, 1885, at Indian River, Fla, by Dr. W. Wittfeld. A few weeks later another was seen, but flying high, and out of reach. These are the only

examples Dr. Wittfeld has seen since he has collected butterflies, that is, in course of five or six years. *Stelenes* is Cuban, according to Gundlach's list, Papilio, vol. i., p. 112. It is also credited to Jamaica by Chenu—perhaps on authority of Doubleday's Genera, which I have not at hand to refer to; though Gosse in his Naturalist in Jamaica does not mention it. It is found on the Continent from Mexico to Brazil. In my Synopsis, 1872, I credited this species to New Mexico, but on what authority I quite forget. At any rate, it was erroneous. Nor has it been taken in S. W. Texas, as Strecker's Cat., 1878, says. In my Cat., 1877, I rejected the species for want of authentication. Its capture in Florida is the first instance known to me of its having been taken in the U. S. The species is very showy, expanding nearly 4 inches. Color pale brown, or blackish-brown, with a broad belt common to both wings of yellow green, and with submarginal green spots. Victorina ranks between the genera Timetes and Diadema. Dr. Wittfeld has at Indian River, at one time or other, taken three species of Cuban butterflies in single instances, viz., Papilio *Polydamas*, Diadema *Misippus*, and *V. Stelenes*.

LYCAENA PSEUDARGIOLUS Bois.

Spring form, PSEUDARGIOLUS.

In But. N. A., vol. 2, I stated that this form of the species must reproduce itself in May of the next year; the chrysalids "probably produce butterflies in small numbers in July and later, but most of them hibernate, and give *Pseudargiolus* (form) the following May, or earlier"; and I said that I had never yet succeeded in getting a chrysalis completely through the winter. Some time in the winter, when the butterflies (in the house) were ready to emerge, the shell of the chrysalis proved too hard for them to force it open, and they died prisoners, but with full color and markings of *Pseudargiolus* in the wings. Observations in the field, as I related at length, supported the view I had taken as to this form of the species.

In May and June, 1884, I had got together 28 chrysalids of form *Pseudargiolus*. In July, I buried them under rocks in the forest, in a shallow box filled with leaf mould—first scalded to kill eggs or larvæ of depredating insects—the upper and under side of the box being covered with fine wire gauze. This seemed to be as near as possible to the natural conditions, consistent with protection against marauders, as I could get. On 27th October, I opened the box, and found 26 chrysalids apparently alive (as they had on trial perceptible weight), and two

crumpled butterflies, form *Neglecta*. The box was then returned to its hiding place. On 26th March, '85, I brought the box to the house, the day being warm and spring-like. In ordinary years spring is fully opened by end of March—fruit trees in blossom. I found several of the chrysalids dead, changed in color to yellowish-brown, and light in weight. But others had weight and were of good color. There were no indications of the wing markings through the shells. Lest the warmth of the house should dry the chrysalids, they were placed on a shelf outside, shaded from the sun. For several days thereafter cold weather, frequently with snow, prevailed, but about middle of April pleasant days came again. On 18th, I saw the first *L. Violacea* on the wing, and I then looked at the chrysalids. Several showed the black margins of female through the wing covers, and I expected the butterflies to emerge forthwith. But as none came, two days later I brought in the box and examined the chrysalids one by one. None of them now had any perceptible weight. On opening the shells, one after another, the butterfly was dead, but with full color of form *Pseudargiolus*, wherever there was any color at all. The bodies were exhausted of fluids and flattened, but were flexible, and the wings were not dry, but could be readily separated. One live butterfly only appeared, and on removal of the shell, it crawled up a bit of cloth on side of the box. But the wings did not expand and the insect soon died. Its body was as thin as the others, and plainly it would have quickly died in the chrysalis. It had not the strength to break out, and the shell, and all the shells, were hard. There was no example in these butterflies of form *Violacea*. The experiment was satisfactory, though I would have been glad of the perfect butterflies. As stated in But. N. A., *Violacea*, the earliest of these forms, originates *Neglecta* of July, and the late *Neglecta* hibernate in chrysalis and give *Violacea* in March and April the next year. But the bulk of the *Violacea* chrysalids must hibernate, though the actual proof by the chrysalids is yet wanting. I have had the same difficulty in carrying them through the winter as with those of *Pseudargiolus*. The singularity of this complicated species is that the form *Pseudargiolus* is stuck in between *Violacea* and *Neglecta*, in the spring, with no direct relation to either. This form perpetuates itself, but gives rise to some *Neglecta* in the late summer, and these last produce *Violacea* the next spring. If this late connection were severed, as is conceivable, *Pseudargiolus* would stand alone, separated entirely from the other forms of the species, and there would be nothing

to show how it originated. No doubt that is one way in which species come to exist.

NEONYMPHA CANTHUS, Bois.–Lec.

CHRYSALIS.—Length .62 inch; breadth across mesonotum, .16, across abdomen, .17 inch; cylindrical, slender; the edges of wing cases prominent on the dorsal side; head case more produced than in Debis *Portlandia* (which species this chrysalis otherwise much resembles), bevelled transversely to a sharp edge, excavated roundly and shallowly at the sides, the top a little incurved, the corners sharp; mesonotum prominent, carinated, the sides flat and sloping, the apex almost angular, being rounded but slightly; color green; the top of head case and dorsal edges of wing cases buff; a buff mid-dorsal stripe, and one on either side of this (sub-dorsal); also a faint lateral stripe of same color.

In CAN. ENT., xv., p. 64, 1883, I described all the preparatory stages of *Canthus*, except the chrysalis, which I had been unable to obtain, larvæ which I had had at one time or other dying before pupation. I received the chrysalis described Aug. 22, 1884, from Mr. James Fletcher, at Ottawa. Mr. Fletcher writes: "The larvæ were quite common this spring in beating the high lake and swamp grasses." It is probably because the natural food of *Canthus* is swamp grass that I have always had so much difficulty in rearing the larvæ on meadow or lawn grass. The larva is in shape, and in most respects, closely like that of *Gemma*. Both are very slender and both carry on head a pair of conical horns, and the chrysalis of *Gemma* shows two long conical processes at end of head case. But in the chrysalis *Canthus* is like *Portlandia*, and of the Satyrus type (as in *S. Alope*), stout bodied, with truncated head case. With this chrysalis we now know every stage of the several species of Neonympha which live east of the Mississippi River.

Experiments with larvæ as to food plants.

The larvæ of *P. Rutulus* feed on willow, and this seems to be the food they prefer, just as *Turnus* prefers the Tulip tree where there is a choice. *Rutulus* was observed by Mr. Behrens, in 1884, on species of Populus. I received larvæ just hatched from Mr. Wright, and lost one brood by giving them Tulip leaves. After two or three days the last one had died, with symptoms of poisoning. Having heard that apple and cherry were food plants of the species, I offered these and willow to the next lot of

larvæ, and found all gathered to the willow. Henceforth I had no difficulty, and found these larvæ as easy to rear as larvæ of *Turnus*.

This suggested an experiment on *Turnus*. There are several lists of food plants of this species, two of them by Mr. Scudder, and nowhere is willow mentioned. I was feeding a brood of these larvæ last year, and on 20th August, immediately after 4th moult, separated part of them and gave willow only. They nibbled a little now and then, but in effect eat nothing, did not grow, were flabby to the touch and empty, and all died of starvation by 2nd Sept. The remaining larvæ, on Tulip, reached pupæ 30th Aug. and 1st Sept.

On relaxing dried butterflies.

I notice, ENT. xvi., 220, something on modes of relaxing insects. For butterflies, I formerly used an earthen jar, with cover, in which were a few inches damp sand, the insects being laid on the sand. But if the sand was at all too wet, the insects were liable to be saturated and much damaged, and if left too long, to mould. For many years I have used a towel, first dipped in water and wrung out, folded twice, and laid on a board. In the folds the papers are laid, or if the butterflies are removed from the papers, they are placed between layers of newspapers. Small species, as Lycaenæ, relax perfectly in 5 or 6 hours; most Hesperians over night; Colias and Argynnis within 24 hours; and Papilios in from 24 to 48 hours, according to size of body. It may be necessary, and certainly will be in warm weather, to wet the towel again, and perhaps with Papilios more than once. On removal, when about to spread, if moisture shows on the under surfaces, remove it by blotting paper. The advantage of this mode is its convenience, and the fact that the insects will not become too wet, nor can they mould, as the towel becomes dry too soon for that.

Butterflies on pins I float on cork in covered tin pails—two quart is a good size. In this case no moisture collects, and the relaxation is about as rapid as in the towel. Small species I often float in a tin-capped glass. If one has not the pail at hand, the floating may be done in anything, a bowl or a pitcher, but a wet cloth should then be laid over the top.

On carrying hibernating larvæ through the winter.

I have sometimes so carried larvæ in ice boxes, or in ice houses, or in snow banks, by aid of friends in the Northern States mostly, but last fall I heard of a large room called a "cooler" at the Sanitarium at Clifton

Springs, New York, in which meat and vegetables are kept, the temperature averaging 40° all the year, and my application for a little space was kindly received. In October, I sent on two boxes by express, in which were a large number of larvæ, some of them very rare. Of these were Argynnis Halcyone, just from egg; Satyrus *Charon*, also just out of egg. These small larvæ were in paper pill boxes, inside tin. There were also a few larvæ of Chionobas *Chryxus*, Hip. *Ridingsii*, Colias *Alexandra*, Phyciodes *Picta*, in stages from second to fourth; and several Melitaea *Rubicunda*, past third moult, from Vancouver's Island, and *Phaeton* at same stage. Early in March I received the larvæ per express. On opening the boxes nearly every one of the young larvæ first named were alive, and in a few moments were moving. The larger part of *Rubicunda* and *Phaeton* were in good condition. One *Alexandra* out of two was healthy, and one *Picta* out of three. The *Chryxus*, past third moult (one), and the *Ridingsii*, past first (one) were dead. On the whole, there was scarcely any loss from the four months seclusion. The Chionobas, I am disposed to think, died in transit to me, from rolling about in its box, as it was stout and healthy looking when I received it. Probably all the Satyrid larvæ would have done better if they had not been allowed to feed in the fall, but had on hatching been subjected to the cold. I had no plants ready for these larvæ on their arrival except grass, and on this I placed part of the *Charon*, who very soon began to eat along the edges of the leaves. The remainder of all species I put on ice, or under rocks in the woods, to stay till I could force food-plants for them.

ADDITIONS TO NORTH AMERICAN HYMENOPTERA.

BY L. PROVANCHER, CAP ROUGE, QUEBEC.

ICHNEUMONIDÆ.

In a lot of Hymenoptera captured in Vancouver Island, and sent me by Mr. Brodie from Toronto, I found the following new species:—

Ichneumon Vancouveriensis, nov. sp.

♂—Length, .62 inch. Black; face with four dots white, one on each side near the clypeus and one under each antenna. These entirely black

and sub-moniliform. One dot on the alar scales with a line before and another one under, the collar, and scutellum, white. Wings slightly infuscated; the areolet pentagonal, the nervures black. Metathorax with the angles projecting, sub-spinose, the ventral area transverse, its anterior angles rounded. Legs black, the four anterior tibiæ with a white line exteriorly, the posterior with a smaller one near the base. Abdomen elongate, with the peduncle slender and punctured, entirely black. Vancouver.

Allied to *Ich. subcyaneus* Cress., but of a larger size, with crura entirely black, and white markings also different.

PLATYSOMA, nov. gen.

(From *platys*, depressed, and *soma*, body.)

Head large, much produced behind the eyes, these somewhat small. Antennæ half the length of the body, setaceous, thick, with short articles sub-moniliform. Thorax long and depressed, the prothorax produced anteriorly in the form of a neck, narrower than the head; the mesothorax with its median lobe advanced and elevated upon the prothorax; scutellum depressed, with a fossula before; the metathorax elongate, bearing four longitudinal carinæ. Wings short, areolet wanting, the nervule dividing the two cubitals short. Legs with crura swelled, inermous, the tibiæ cylindrical at the base, thence enlarged and slightly compressed, the intermediate ones much compressed in the middle of their enlarged portion. Abdomen elongate, shortly pedunculate, the first segment depressed, bearing a carina on the lateral edges, the extremity slightly compressed and cleft under side for the reception of the terebra, which is as long as the body.

Allied to *Xylonomus* and *Odontomerus*, but differing from both by the shorter and thicker antennæ, by the inermous crura, and by the form of the tibiæ.

Platysoma tibialis, nov. sp.

♀—Length .45 inch, length of the terebra .45 inch. Black, with legs rufous and abdomen brownish rufous. The head and prothorax strongly punctulate, the fossula before the scutellum striate. The metathorax transversely striated at the base between the carinæ. The first abdominal segment finely aciculate between the lateral carinæ. Valves of the terebra brown ferruginous. Vancouver.

Limneria compacta, nov. sp.

♀—Length .23 inch. Black, with the legs and abdomen rufous. Mandibles, palpi, and alar scales, white. Antennæ filiform. Thorax short and thick, the mesothorax gibbous, the metathorax declivous. Wings slightly infuscated, with a triangular sessile areolet. Legs rufous, the posterior coxæ black at the base inside. Abdomen forming a small elongate club with a slender and elongate peduncle, black at the base and extremity. Terebra about one fourth the length of the abdomen, recurved upwards. Vancouver.

Closely allied to *L. ruficoxa* Prov., but differing by the sessile areolet, the legs entirely rufous, etc.

Mesoleptus fasciatus, nov. sp.

♂ – Length .20 inch. Black, the face under the antennæ [illegible] have not patch above their insertion, the palpi, the alar scales, the l[illegible] edges of the prothorax, with the four anterior coxæ and their trochanters, white. Antennæ shorter than the body, setaceous, black, the scape obscurely whitish underneath. Metathorax large, with distinct elevated lines. Wings hyaline, without areolet, the stigma pale. Legs pale rufous, the posterior with the coxæ, and the extremity of their tibiæ and tarsi, brown, more or less obscure. Abdomen rather stout, linear, black, obscurely white on the sides, the segments with a polished fascia at their posterior edge. Vancouver.

Differs from *M. decens* Cress. by its white markings and the sculpture of its metathorax.

Echthrus Provancheri, Brodie.

(Mr. Brodie having kindly dedicated to me this beautiful new species, and not having seen its description published, I submit it here below.)

♀—Length .48 inch. Black, abdomen partly rufous; head and thorax entirely black, very finely punctured; the face with a small tubercle in the middle under the antennæ; mandibles, palpi and antennæ, all black. The mesothorax trilobed, the metathorax rugulose on the sides and posteriorly. Wings slightly infuscated, the nervures and stigma black, the areolet large, subquadrate. Legs rufous, the anterior coxæ, the crura and tibiæ of the posterior pair at their extremity, black, the posterior tarsi with the first and last article black, the median ones white. Abdomen pedunculate, its peduncle polished and shining, the other segments punctulate;

segments 1, 2 and 3 bright rufous, the rest black with the penultimate white. Terebra black, thick, very nearly as long as the body.

♂—With palpi and four anterior coxæ and trochanters pale, no white patch on the penultimate segment of abdomen. Vancouver.

This species is easily distinguished by its coloration.

BRACONIDÆ.

Phylax pacificus, nov. sp.

♀—Length, .35 inch; terebra about the same length. Brown ferruginous; the head, the pro and mesothorax with the last segments of the abdomen, black. Antennæ black, long, setaceous. Head large, produced behind the eyes; vertex convex. Metathorax ferruginous, punctured. Wings infuscated. Legs ferruginous, all the tibiæ with a small pale ring [illegible]e. Abdomen finely aciculate on the first segment and the basal [illegible] the second, the other ones polished, shining. Terebra black, of the same length as the abdomen. Vancouver.

Phylax niger, nov. sp.

♂—Length .23 inch. Black, with a whitish pubescence. The head much produced behind the eyes. Antennæ long, slender, setaceous. Wings slightly infuscated, the nervures black. Legs rufous, coxæ, tibiæ and the extremity of crura black. Abdomen elongate, black, the first segment with the basal half of the second aciculated. Vancouver.

ENTOMOLOGY BY THE ELECTRIC LAMP.

BY PROF. E. W. CLAYPOLE, AKRON, O.

During the past winter an installation of about 100 arc-lamps was established at Akron, O. They hang as usual over the middle of the street. Early in the summer it was evident that they would afford a fine hunting-ground for the entomologist, and accordingly several members of the Natural History Society of Akron resolved to turn the opportunity to account by making collections of the insects attracted by the light and comparing and noting the results.

I have not yet ascertained what others have done, but the following notes of my own observations may interest some readers of the ENTOMOLOGIST.

At the opening of the season the Cockchafer *(L. fusca)* was almost the only visitant, but in such numbers that specimens might be collected by the quart for a few evenings. Gradually other species appeared. *Belostoma americanum* and *Calosoma calidum* were conspicuous, the former for its size, and the latter for its beauty. The former has obtained the popular name of the "electric light bug." It is supposed to have appeared with the lamps, and is oftenest brought to me for identification. The grave-digger beetles, *Necrophorus*, *Silpha* and *Hister*, were not infrequent. Why they come to the light is not easy to say. Possibly the carrion which they usually seek is slightly phosphorescent, and attracts them by its glow, and they are deceived by the brilliancy of the electric arc. Several small Carabids were abundant about the same time, but not yet been identified.

As June advanced moths became more abundant than beetles, not because the latter fell off, but because the former largely increased. On warm evenings a perfect swarm played round the lamps, hour after hour. Every now and then one and another dashed into the globe, struck the glowing carbons, dimmed the light and was killed or consumed with a hissing noise. By morning a handful, sometimes a half pint, of dead insects was accumulated at the bottom of the lamp-glass, mostly scorched and burnt. In this way immense numbers are destroyed, but no apparent diminution ensued. One morning in June I obtained about a hundred specimens of the very abundant little grass moth *(Crambus mutabilis* Clem.) from every lamp examined. This means a destruction of above ten thousand individuals nightly of this one species. As the process has been going on for at least a fortnight, the 102 lamps in this city have killed about 1,500,000 individuals. Yet still they come, and in undiminished numbers.

Since then Dart-moths (Cut-worms) of various species have begun to appear. About the middle of June I collected above 50 specimens from three lamps. It was apparently *A. subgothica* Haworth, though Riley (Entomolog. Rep. of Mo., 1868, p. 82) says this species does not appear till September. Positive identification of these moths is often difficult. This implies the destruction of about 1,500 nightly. Other species of Dart-moths not yet identified were equally numerous. One would think such wholesale slaughter must diminish their numbers, and perhaps the

results will be seen in future years. If the eggs were laid previously no such result could be expected. But the frequent occurrence of eggs in the collecting boxes shows that this is not the case.

The Tiger Moths (*Arctia*, etc.) have been equally abundant, especially *A. virgo*. Were all that I have collected identified, as I hope they soon will be, the list would be long.

The white-lined Hawk Moth (*D. lineata*) with others of the same family, is a frequent visitor. The Water Tiger, *D. marginalis*, with two or three smaller Dytiscids, are often taken. These and most of the heavy fliers strike the globe and fall stunned to the ground, but soon recover unless boxed at once.

The Stag Beetle (*L. dama*) and Fire fly (*P. pensylvanica*) appeared later and less frequently with the great Lebia (*L. grandis*) and *Dichelonycha elongatula*, the latter for a few evenings in great abundance. A single specimen of the Codling Moth was captured.

About the end of June a new fauna began to appear. The Cockchafers had nearly disappeared. But the great Ground Beetle (*H. caliginosus*) supplied the place, and in so great numbers that one evening I filled a four-once bottle in fifteen minutes. With it came two, to me, unexpected visitants, the Blister Beetles (*L. vittata* and *atrata*).

This is but a partial list of the species already collected. Several of the large and conspicuous moths have been met with, and I hope later to send a longer catalogue.

But we are not the only insect-hunters about the electric lamp. Every evening the toads congregate until the ground is alive with them, and food is so plentiful that they are sometimes almost unable to return to their holes and often past hopping. Several times also I have suspected the presence of skunks, but have never yet seen a frog. Small boys, too, flock to the lights for the sake of stamping on the cockchafers and other insects that lie disabled on the ground. Between the toads, the skunks and the small boys, the entomologist is sometimes hard put to it, and must work late at nights or betimes in the morning, or both. Could he only in addition to the real insects make a collection of the huge phantasmagoric spectres that fly and creep about the roadway projected by the intense light, he would have an array of "bugges" that might fairly be called "terrors by night."

CORRESPONDENCE.

Dear Sir: The following insects have lately een bdetermined for me by Dr. H. A. Hagen, of Cambridge. As they are not included in the Society's published lists, I send them just as received for publication in the ENTOMOLOGIST.

J. ALSTON MOFFAT.

1. *Dicosmoerus (Stenophylax) argus* ♂ Harris. Desc. and fig. in Harris's Ent. Correspond.; also by Provancher.

2. *Fteronarcys proteus* Newm., ♂. Also in N. Y.

3. *Leptoterus nobilis* Hag. Nearly destroyed, but I think surely, though there exist related species.

4. *Ctenophora frontalis* Sacken, ♀. In pieces.

5. *Mallota posticata* Fabr.

6. *Epeolus*, probably; in six or seven pieces.

7. *Archasia galeata* Fabr.

For determination of the four non-Neuroptera, I have taken the names out of our collection. The *Mantispa*—not *Mantis*—is a Hemerobid, and is *M. brunnea* Say; also described by Provancher as very common at St. Hyacinthe. His specimen, *M. Burquei* Prov., was a variety.

H. A. HAGEN.

ROCKY MOUNTAIN BUTTERFLIES.

Dear Sir: Please add the following species to the list of diurnals collected by me in Rocky Mts., beginning at No. 123:

123. *Papilio indra* Reak. Seen but not taken at Koutanai Pass, afterwards identified from specimens received from the Pass.

124. *Pieris vernalis* Edw. Crow's Nest Pass.

125. *Colias elis*, nov. spec., Strecker, (Discovered 1884.) Kicking Horse Pass summit.

126. *Colias chrysomelas* Hy. Edw. 1 ♂ only taken. Calgary.

GAMBLE GEDDES, Toronto, Ont.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., JULY, 1885. No. 7

NOTES AND DESCRIPTIONS OF NORTH AMERICAN XYLOPHAGIDÆ AND STRATIOMYIDÆ.

BY S. W. WILLISTON, M. D., PH. D., NEW HAVEN, CONN.

Xylophagus decorus, n. sp.

♀. Length 13 mm. Black, legs yellow. Front convex, but little shining, thinly brownish dusted. Antennæ black, the tip of first joint and the second more reddish brown; elongate, the first joint rather longer than the distance from the insertion to the ocelli. Proboscis black Dorsum of thorax shining on the sides, in the middle with two broad brownish pollinose stripes, separated by a shining linear space. Pleuræ shining black. Abdomen blackish brown, shining. Legs, including the coxæ, reddish yellow, the tips of all the tarsi black. Wings nearly hyaline, a broad brownish band, near the middle, narrowed and evanescent posteriorly, the outer cross-veins clouded and the outer part of the wing cinereous.

One specimen, Washington Territory (H. K. Morrison). The abdomen probably varies in depth of color.

Xylophagus gracilis, n. sp.

♂, ♀. Length 9-10 mm. Black, legs light yellow. Front grayish dusted. Antennæ black, the third joint toward the base on the inside, yellowish; only a little longer than the head; first joint only about three times as long as the second, considerably shorter than the distance from the insertion to the ocelli. Thorax shining, the dorsum with two broad, narrowly separated, pollinose stripes; humeri and post-alar callosities obscurely yellowish. Halteres yellow. Abdomen shining black, white pubescent, rather slender and cylindrical in the male. Legs, including the coxæ, light yellow; outer end of all the femora, and the tip of hind tibiæ, lightly brownish; tip of the tarsi blackish. Wings hyaline, variegated on the outer half with brownish, the stigma narrowly brown.

Two specimens, Washington Terr. and Mt. Hood, Oregon (H. K. Morrison).

Coenomyia cinereibarbis Bigot. Annales Soc. Ent. Fr. 1879, 194.

This species was described by Bigot from a specimen from Baltimore. As usual with this author, he does not point out differences, merely saying that this species resembles certain varieties of *C. ferruginea* in color. Now it is well known that *C. ferruginea* is very variable in coloration, so much so, in fact, that it has received twelve or thirteen specific names. The coloration hence of Mr. Bigot's specimen, from analogy, is comparatively worthless as a specific character. Nothing else is mentioned except the villosity. From this, however, I believe I recognize the species in a male specimen caught in the woods near New Haven, in June. It is of a deep brownish black, the femora of the same color. The abdomen above has the second segment wholly black (shining), the third segment with a large light yellow spot on the posterior angles, the fourth segment with a similar but smaller one, and with the posterior margin likewise yellow, the remaining segments chiefly yellow. The species will be best distinguished from *C. ferruginea* by the presence of rather long and abundant yellow pile on the dorsum of the thorax, whereas in *ferruginea* the dorsum is nearly bare.

Subula pallipes Loew.

This species has hitherto only been known from the Atlantic States, but specimens from Montana (Prof. Comstock, No. 50) and Southern California cannot be separated. The western specimens show a broader yellow hind margin to the abdominal segments, but otherwise I can distinguish no difference.

Subula parens, n. sp.

♀. Length 13 mm. Front black, light yellowish pubescent, shining about the ocelli. Antennæ black, the inner side from the base, except the upper margin, yellowish red. Face black, proboscis and tip of the palpi reddish yellow. Dorsum of thorax black, the lateral margins, interrupted just behind the suture, and extending inwards a short distance in front, and a slender spot on the suture on each side, yellow. Pleuræ and coxæ black, the former with a median vertical spot, connected above with a slender stripe reaching from the humeri to the root of the wings, and a large spot on the sides of the metanotum, yellow. Abdomen brownish

red, black at the base. Legs yellow, a broad preapical ring on the hind femora black, the ends of the hind tibiæ brown, hind metatarsi a half longer than the remaining joints together. Wings strongly tinged with yellow, the veins a little darker.

One specimen, Washington Ty. (H. K. Morrison).

Beris mexicana Bell.?

♂, ♀. Length 7–8 mm. Eyes pilose, broadly contiguous in the male, the frontal triangle small; front in female rather broad, with parallel sides. Head black, shining, with luteous pile. Antennæ black, the base of the third joint yellowish; third joint thick at the base, the whole antenna not longer than the distance from its base to the ocelli. Thorax and scutellum bright shining green, with a purplish reflection, pile in the male only moderately long, luteous; scutellum with six blackish spines, and on each side sometimes with a rudimentary additional one. Abdomen black, but little shining, along the sides with yellowish pile. Legs yellow; all the tarsi, except the base or larger part of the first joint, black. Hind metatarsi in the male considerably swollen, longer than the remaining joints together. Wings strongly tinged with yellowish, the stigma large, brown.

Six specimens, Colorado (Morrison, Prof. Comstock, No. 47). Some of the specimens have the hind femora above at the tip blackish. This species is most closely allied to *B. mexicana* Bell., but differs in the abdomen being wholly black. A comparison with Mexican specimens is needed.

Sargus decorus Say. (= ? *S. xanthopus* Wied.)

Hab. New Eng., Colo., Wash. Ty.

Sargus viridis Say.

(*Sargus nigribarbis* Bigot, Annales Soc. Ent. France, 1879, 224.)

Hab. Eastern, Middle and Pacific States.

This species is a true *Sargus;* the eyes of the male are not contiguous, and are bare.

Macrosargus clavis, n. sp.

♂, ♀. Length 9-10 mm. Vertical triangle and the under part of the face in the male, and the upper two-thirds of the front and the face likewise in the female, bright shining green, frontal triangle and the lower part of the front (♀) moderately projecting, yellowish white, front in the

female of moderate width, parallel. Antennæ and proboscis yellow. Thorax bright shining green; humeri and a slender line reaching to the root of the wings, and the sides of the metanotum broadly, light yellow; pile of dorsum and mesopleuræ yellow. Abdomen in the male pedicillate, the second segment cylindrical, in the female moderately contracted toward the base; black, with a bronze lustre; second segment in the female, except the lateral margins, yellow; the posterior angles of the third and fourth segments narrowly yellow; in the male the second segment is obscure yellow; pile golden. Legs, including the coxæ, yellow. Wings nearly hyaline.

Two specimens, Virginia (Theo. Pergande) and North Carolina (Prof. Comstock).

Ptecticus Sackenii, n. sp.

[*Ptecticus testaceus* Osten Sacken (non Fabr.), Cat. Dipt. 45; Lynch Arribalzaga, Catalogo, etc., 125 (17).]

♀. Length 11 mm. Front narrow, shining black, the lower part and the face yellowish white. Thorax yellow, the dorsum with three broad, more brownish, stripes. Abdomen reddish yellow, the second, third and fourth segments with a black fascia, acute at each end and not reaching the lateral margin. Legs yellow, the hind tibiæ brownish, becoming black at distal end, hind metatarsi black, the following joints nearly white, last three joints of front tarsi blackish, of middle tarsi brownish, the third joint of all these tarsi less dark. Wings hyaline, with a light yellowish tinge.

A specimen from Florida (Pergande) agrees with the ones mentioned by Baron Osten Sacken in the note on page 45 in having the four last joints of the hind tarsi yellow, the terminal ones not being black, as described. Lynch says in regard to these species (l. c.): "Los ejemplares de Nueva York de que habla Osten Sacken deben pertenecer a otra; todos los mios tienen los tarsos posteriores como los describe Rondani."

Ptecticus similis, n. sp.

♂, ♀. Length 11-12 mm. Head and antennæ wholly yellow, the frontal tubercle below prominent, the small ocelliferous tubercle black. The front in the female narrow; in the male the eyes nearly contiguous above the tubercle. Thorax yellowish amber color, the humeri, postalar callosities, the sutures narrowly, and a large spot on the sides of the metanotum, light greenish, two linear stripes on the back part of the dorsum,

less distinctly so. Knob of the halteres green. Abdomen brownish yellow, the incisures and posterior angles of the segments yellow, the sides of the base greenish, across the anterior part of the segments the color broadly brown. Legs reddish yellow, the hind tibiæ and tarsi brown, two last joints of all the tarsi blackish. Wings with a faint yellowish tinge.

Three specimens, Virginia (Pergande), and Georgia. I would at first have identified this species with *Sargus trivitatus* of Say, but grass green can in no wise be applied to my specimens, the color being so faint green that it is scarcely observable to the naked eye. The third joint of the antennæ is by no means rounded, but trapezoidal in shape.

Hermetia aurata Bellardi, Saggio, etc. i., 27, tab. i., fig. 8; Loew, Centur. x., 11 *(H. chrysopila)*.

A single specimen from New Mexico agrees very well with the descriptions. The first joint of the antennæ is chiefly black.

Hermetia lativentris Bellardi, op. cit., 27, tab. i. fig. 9.

A female from New Mexico. I refer to this with some doubt. The head is wholly yellow, except the ocelli; the first segment of the abdomen is not black, the second has a narrow median black stripe. Bellardi's figure shows but three posterior veins, probably an inaccuracy.

Hermetia Comstocki, n. sp.

♂, ♀. Length 15-18 mm. Head reddish yellow, with yellow pile. Antennæ only a little darker yellow, the tip of the second joint and the lamella deep black; lamella rather broad. Dorsum of thorax blackish brown or black, the sides and the middle behind brownish red; the black forms two rather broad median stripes, abbreviated behind, separated by a golden tomentose stripe; on each side there are two large indefinite black spots; on each humerus, running inwards and backwards for a short distance, a spot of golden tomentum. Pleurae, except above and the sides of the metanotum, black, a spot above, contiguous with that on the side of the dorsum, clothed with yellow pile. Scutellum yellowish red, the base narrowly black. Abdomen brownish red, but variable, sometimes brown or blackish, the second segment on its posterior border and the remainder of the abdomen, with short thick golden pile, changeable in different reflections. Abdomen elongate, broadest on the second segment. Legs wholly reddish yellow, front coxæ in front of the same color, the tarsi a little lighter, tibiæ somewhat dilated, the hind pair very distinctly

bent beyond the middle in the male. Wings deep brown along the anterior half, broadly infuscated along the posterior border, leaving a space hyaline in the anal cell and the base of the fifth posterior cell.

This is a handsome large species, rather larger than *illucens*, which it resembles in shape, the abdomen being more convex. Two specimens, Arizona, from Professor Comstock (No. 46).

Euparhyphus, n. sp.?

♀. Length 6 mm. The head and thorax of this species agree throughout with Loew's description of *E. stigmaticalis*, except that the scutellum is yellow, with the base narrowly black. The abdomen shows a distinct difference in that the first segment has a small lateral spot, and the second, third and fourth segments with a large green triangle on the posterior angles, extending to the front margin of the segment and touching each other behind on the fourth segment; the inner margins of these green spots are yellowish. The fifth segment is wholly greenish and yellowish to the naked eye. The abdomen shows a broad greenish yellow margin. The legs are wholly yellow, except the last three joints of the tarsi, which are black. The wings agree also, except that the veins and stigma are less dark.

One specimen, Washington Territory.

Euparhyphus ornatus, n. sp.

♀. Length 6 mm. Front and face yellow, with black markings, as follows: A spot on each side in front of the ocelli; a slender stripe from near the ocelli to the oral margin, interrupted at the antennæ; a broader stripe (broader above) beginning a little lower on each side and reaching to the oral margin. First two joints of the antennæ yellow, the third wanting. Occiput black. The lateral orbits yellow. The lateral margins of the face, and the posterior orbits below, white pollinose. Thorax black. Two very slender dorsal vittulæ, broadly separated, the humeri and a slender line reaching to the base of the wings, the postalar callosities, the margin of the scutellum and spines, a spot in front of the wings on the pleuræ, contiguous with the line above it, and a smaller spot below, yellow. Abdomen black; the third segment on each side, with a rather large semi-elliptical spot, the slender lateral margin of the remaining segments, and the broader hind margin of the last segment, yellow. Legs yellow; the hind femora and tibiæ in their middle infuscated; the last

three joints of all the tarsi blackish. Wings with the veins of the disk fuscous; third vein furcate.

One specimen, Washington Territory.

Euparhyphus bellus Loew.

Three specimens from Pennsylvania, all evidently of the same species. I identify as this, but the species is variable. The head in both females agrees with the description; the head of the male likewise agrees with the specimen spoken of in the note. In one female there are two slender yellow vittulæ in the front of the dorsum, in the other two it is wanting. The scutellum is wholly black in all, except the spines. The abdomen in all agree in having two small circular yellow spots on the disc of the third segment, a minute yellow spot on the posterior angles of the third and fourth segments, and a large semi-oval yellow spot on the fifth segment, otherwise the abdomen is wholly black. In one of the females the first discal posterior vein is but the merest rudiment. I do not doubt but that Loew's male and female specimens belonged together.

A single male specimen from Connecticut is related, but it may be different. It is somewhat larger, and differs from my male of *E. bellus* in having two larger yellow spots on the disk of the third segment, and two additional similar ones on the fourth segment.

Clitellaria lata Loew.

A male specimen from Washington is apparently this.

A female from California has the pubescence of the head and abdomen more golden colored than white, and the third antennal joint is much more thickened.

Clitellaria argentata, n. sp.

Length 8 mm. ♂. Black, with light colored pile and silvery pubescence. Eyes broadly contiguous, thickly fuscous pilose. Pile of the front and face light gray. Antennæ rather slender; first two joints, tip of the third, and style black, remainder yellowish red. Thorax, with light gray pile and nearly uniform recumbent silvery pubescence; a slender median stripe, a little broader, interrupted one, on each side, two small spots on the pleuræ, and the metanotum, glabrous; spines of the scutellum yellow. Abdomen, with short recumbent white pile, nearly uniform, with small, oval, nearly glabrous spots on the front margins of the anterior

segments. Legs with white pile, the color of the tarsi less dark. Wings nearly hyaline, the stigma luteous.

One specimen, Arizona, (Prof. Comstock).

Cyphomyia, n. sp.

Five male specimens from Jamaica differ from the described species, except perhaps *varipes* Gerst., the description of which I do not have access to. The base of the third joint of the antennæ, and the scutellum, are red, and all the metatarsi, except the tip, light yellow. Otherwise steel-blue black. The eyes pilose.

Nemotelus unicolor, Loew.

Two specimens from Pennsylvania. In one of them the two basal joints of the antennæ are yellowish. Another from Arizona (Prof. Comstock, No. 52) I cannot distinguish.

Nemotelus crassus Loew.

Three specimens from Western Kansas agree with the description of this species, but are somewhat smaller.

Pachygaster pulchris Loew.

Two females from Montana differ but little from eastern specimens. The femora have only a blackish ring in their middle.

Odontomyia cincta Olivier. Encycl. Meth. viii., 432, 3; Macquart, Dipt. Exot. i. 2, 189; Day, Proc. Acad. Nat. Sc. 1882, p. 80 (*O. extremis*, type compared.) Atlantic and Pacific States.

Odontomyia flava Day. Proc. Acad. Nat. Sc., 1882, 76.

The type specimen in my collection is partly destroyed by Anthreni, I give as complete a description as it will permit.

♂. Length 11 mm. Head black, face of usual size, with two obscure yellowish spots below, clothed with light colored pile. Dorsum of thorax black, with rather long light pile. Scutellum black, the spines of the same color, rather small and approximate. Abdomen black, with a rather narrow yellow margin and with two slender, broadly interrupted, yellow. posterior cross-bands (on the second and third segments), venter yellow. Legs yellow; femora at their base, and the distal part of the tarsi brown, the tibiæ in their middle with a brownish ring. Wing hyaline. Veins yellow, third longitudinal vein furcate, third posterior vein rudimentary.

Como, Wyo. Resembles *O. inequalis* Loew, but differs in the scutellum and abdomen.

ON THE HESSIAN FLY IN ITALY.

BY H. A. HAGEN, CAMBRIDGE, MASS.

As I have stated (p. 90, May, 1885), I had made inquiry of Dr. Anton Dohrn about the existence of the Hessian Fly around Naples, Italy. His kind answer, together with interesting notes by Dr. Paul Mayer, gives the following information.

From the two old books quoted by Sir J. Banks (p. 88), Corti is not represented in the library at Naples. Ginnani (Dr. Giuseppe Fatta writes Giannini), Part ii., cap. lx., p. 127-209, gives: "Osservazioni ed esperienze particolari intorno all'infestamente degli insetti." He speaks in this chapter on several flies which attack the grain, among them one which attacks the roots, but his statements do not allow us to decide with certainty whether some of the flies belong to Cecidomyia. Dr. P. Mayer draws my attention to another work which was entirely unknown to me; the copies published are all lithographed: "*A. Costa.*—Lezioni di Entomologia agraria precedute da un quadro generale della classi del regno animale raccolte ed autografate degli alumni M. Pilato e M. Montanari. Portici R. Scuola Superiore d' Agricoltura 1880, 4to., pg. 528, pl. 9."

"*Cecidomyia tritici*, p. 514, sp.

"Body black, sooty; wings blackish, a little paler towards the base; legs brownish. The females deposit the eggs near the joints of the plant and between the stem and the respective leaf. The larvæ, which are hatched, live gregarious near the lower joints of the plant between the leaves and the stem, in which they sometimes excavate niches by shaving the wall of the stem. The plants for this cause sooner or later grow sickly and never straighten themselves. When the larvæ have completed their development, while some give place to an agamous reproduction, others in the very place in which they find themselves are transformed into pupæ, from which after a few days are hatched perfect insects, which lay new eggs."

It follows a short description of the larva. Tearing out the plants and burning them is quoted as a remedy.

"In our province (Naples) the Cecidomyia is not frequent. According to facts which are reported to us, they are abundant in the neighborhood of Brindisi, as Signor Montagna has also assured us, who has sent us specimens."

Dr. A. Dohrn has made inquiries in Rome about the Hessian fly, but without success.

The passage quoted out of A. Costa's lectures is of prominent interest. It proves without any doubt that the insect is *not C. tritici*, which never lays the eggs between the stem and the leaf, and which has never the coloration of the imago as given in the description. Both facts agree perfectly well with *C. destructor*. The determination of a species of Cecidomyia of course can not be considered to be doubtless before specimens have been compared, the more as the short description contains some statements which if based on personal observation, are entirely new.

One of them is decidedly startling. I point to the fact that some larvæ after having completed their development, give place to an *agamous reproduction.* [Compito che hanno, queste larve, il loro sviluppo, mentre talune danno luogo alle riproduzioni agamiche altre, nel posto stesso in cui trovansi si transformano in pupe delle quali dopo pochi giorni schindono gl'insetti perfetti che depongono novelle uova.]

I have purposely put the Italian text in brackets after the translation, as the end of the passage seems to state that the larvæ which have an agamous reproduction do not when full grown transform themselves into pupæ. A similar reproduction, as is well known, has been observed in several species of Cecidomyia by Nic. Wagner, Meinert, Leuckart and others—the so-called paedogenesis. It has never been observed till now for the Hessian fly, and the principal reason for doubt that Mr. A. Costa has really meant paedogenesis, is the fact that he has not expressed himself in a more explicit manner, though he must have been aware of the importance of his statement. I should remark that Mr. Balt. Wagner speaks indeed of two different kinds of larvæ of the Hessian fly. The fact that females of the Hessian fly lay eggs without copulation was long ago published by myself. These eggs developed so far that the segmentation of the embryo was visible. The glass tube containing the eggs having unfortunately been left in the sunlight, no further development could be observed.

Mr. A. Costa states that the larvæ sometimes make niches by *shaving* the wall of the stem. This is contrary to all other observations, which state that these niches are made simply by pressure. Asa Fitch is very explicit about these facts, but when he states that the larvæ do not enter the central cavity of the stem, he is largely at variance with the direct observations of Mr. B. Wagner and myself. I have indeed still before me

stems with the flax-seed (pupa) in the centre of the stem. The larvæ live gregariously, according to Mr. A. Costa, but I have never found more than four pupæ at one joint.

After all, it would be of prominent importance to compare the species from Naples with specimens of the true Hessian fly, which was collected there long ago by Prof. Dana.

DETERMINATION OF THE 36 COLEOPTERA DESCRIBED BY D. ZIEGLER.

BY SAMUEL HENSHAW, BOSTON, MASS.

"Descriptions of New North American Coleoptera," Proc. Acad., 1844, v. 2, p. 43–47; 1845, v. 2, p. 266–272.

	Oxyporus pulcher.	43	W. Pa.	= O. femoralis, Grav.
	Diacanthus splendens.	44	"	Belongs to Corymbites.
	Scyrtes suturalis.		Pa.	= S. orbiculatus, Fabr.
	Hydnocera? longicollis.		"	
5	Spercheus tessellatus.		"	= Belongs to Hydrobius.
	Hydrophilus ovalis.	45	"	Name ‖ = H. ovatus, G. & R.
	Coprobius obtusidens.		"	= Canthon laevis, Drury.
	Pandarus? brunneus.		"	Belongs to Anaedus.
	Cistela marginata.	46	"	
10	erythroptera.		"	= C. brevis, Say.
	Pedilus nigricans.		"	= Corphyra lugubris, Say.
	haemorrhoidalis.		"	= " elegans, Hentz.
	ruficollis.	47	"	= " elegans, Hentz.
	marginicollis.		"	= " labiata, Say.
15	Monohammus tomentosus.		"	= Goes tigrinus, DeGeer.
	Oedionychis? hispida.		"	= Hypolampis pilosa, Illig.
	Philonthus ater.	266	Pa.	= Quedius capucinus, Grav.
	Tachinus puncticollis.	267	"	= T. fimbriatus, Grav.?
	Phoenops luteosignata.		Geo.	= Melanophila notata, L. & G.
20	Agrilus quadriimpressus.		"	= A. acutipennis, Mannerh.
	Limonius definitus.	268	Car.	

	Priocera albomaculata.		U. S.	= Cregya vetusta, Spin.
	? maculata.		Car.	= P. castanea, Newm.
	Trogoderma pallipes.	269	Pa.	
25	Elodes debilis.		Car.	= Anchytarsus bicolor, Melsh
	fragilis.		"	= Cyphon ruficollis, Say.
	Eubria thoracica.		Pa.	= E. nervosa, Melsh.
	Cis thoracicornis.	270	Car.	Belongs to Ennearthron.
	Lathridius musaeorum.		"	= Silvanus advena, Walt.
30	unicolor.		"	= Cercyon castaneum, Say.
	Mycetophagus pini.		"	
	Monotoma opaca.	271	Pa.	= M. fulvipes, Melsh.
	Psylliodes alternata.		"	Belongs to Longitarsus.
	Lycoperdina puncticollis.		"	= Phymaphora pulchella, Newm.
35	unicolor.	272	"	Belongs to Rhanis.
	testacea.		"	" Mycetina.

BIOGRAPHICAL NOTICE OF REV. D. ZIEGLER.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

As I have stated in my notice on Melsheimer, nothing is known of his friend, Rev. D. Ziegler, except the publication of a paper on Coleoptera. Again I am indebted for a large part of the notice now given to the untiring kindness of Rev. J. G. Morris, of Baltimore, for many years a friend and correspondent of Rev. D. Ziegler. Nevertheless, desiring to find out something more of this father of American Entomology, I decided to go to York, Pa., and had the pleasure of seeing his wife, Mrs. Ziegler, his son, Dr. H. A. Ziegler, and the brother of Rev. D. Ziegler.

Daniel Ziegler was born June 11th, 1804, in Reading, Berks Co., Pa. His father, and probably his grandfather, were born in America. There is nothing known by the family as to when their ancestors came to America. After he became of age he studied at the University of Pennsylvania for some time. Later he studied Theology at York, Pa., at the German Reformed Seminary, under the presidency of Dr. Mayer. He was married to Miss Eve Eyster, and had ten children, of whom two sons are living. Kraeutz-Creek Church, six miles from York, was his first

pastoral charge, which he served 37 years. During 18 years he took care of 8 churches; during 27 years of 6 churches. Later he retained only four. Afterwards he was elected to the German congregation in York, which he served about 13 years.

During his ministry in Kraeutx-Creek he began to collect insects and to study Entomology. His son told me that he often accompanied his father, and that he collected insects principally by beating in the umbrella, an excellent method, but very little used, as far as I know, in America. One of his churches was very near to Dr. Melsheimer's home. We owe to this circumstance probably the friendship and the zeal for entomological studies of both. To help Dr. Melsheimer in describing the new species of Coleoptera for the forthcoming Catalogue, Rev. D. Ziegler published in Proc. Acad. Sc. Philad., 1844, vol. ii., p. 43–47, his only entomological paper, containing 36 new species. His scientific correspondence, which was considerable, both American and foreign, cannot be found. His library contained some excellent works, all very much used. When 60 years old he sold, together with Dr. Melsheimer, his collection to Prof. L. Agassiz. The collection was packed up and forwarded to Cambridge by Mr. Ph. R. Uhler, from Baltimore. The contents of the collection are given in my Melsheimer paper, p. 196. Rev. J. G. Morris writes: "I remember hearing Ziegler say that he sold his specimens of Hymenoptera to a Swiss naturalist who has written upon that order, perhaps to De Saussure." This may explain the fact that the collection contained only 60 species of N. Amer. Hymenoptera and 14 from Europe. Rev. D. Ziegler died May 23, 1876, in York, Pa., 71 years, 10 months, 12 days old.

"There was nothing whatever eventful in his life, and besides his few entomological contributions, he was nothing more than a plain, plodding, honest country parson."—(J. G. Morris).

DESCRIPTION OF TWO NEW VARIETIES OF CATOCALA CEROGAMA, Guen., WITH NOTE ON A THIRD.

BY PH. FISCHER, BUFFALO, N. Y.

C. aurella, ♀, new var.

Primaries and thorax light gray, strongly shaded with yellow; h. p. and t. p. line with t. a. line very distinct; teeth below U somewhat

rounded ; reniform indistinct ; subreniform distinct ; a broad, pale, tan-colored line (outside of white shading of t. p. line) running parallel with t. p. line.

Secondaries bright yellow ; median band black, narrow, even, not reaching inner margin, marginal band broad, black with a slight yellow tinge ; fringes dirty white ; abdomen ochre-yellow.

C. eliza, ♀, new var.

Primaries very dark, powdered with black, a large egg-shaped whitish dash near apex reaching costa ; another larger one, shaded somewhat with dark gray, extends from the elongated U to lower margin. Whitish, slightly powdered with gray at base. T. a. line edged with an unusually broad white dash reaching from costa to base of subreniform (on its inner side), from which it is divided by a narrow dark line. All these white dashes are very prominent and showy. Reniform not very distinct.

Secondaries more like the typical form, with the exception of being lighter and more yellowish at base ; fringes white, except at ends of veins.

The third specimen comes nearer the typical *cerogama*, and is a male. The primaries are strongly marked, slightly darker ; reniform distinct ; subreniform met by a heavy black dash on the side towards base, running along t. a. line to costa. There is the "slightly brown" of the var. *Bunkerii*.

Secondaries with a narrow yellow band, the black quite prominent and with a faint purple hue. Fringes white tipped with black.

The aboue specimens are in my collection.

WHITE ANTS DESTROYING LIVING TREES AND CHANGING THF FOLIAGE, IN CAMBRIDGE, MASS.

BY H. A. HAGEN, CAMBRIDGE, MASS.

The common white ant, *Termes flavipes*, destroys dead wood, stumps of trees and timber, just as does its nearest relative, *T. lucifugus*, in Europe. Of the latter species some cases are reported where living pines and oaks have been destroyed in the South of France. For *T. flavipes*, only one case is known, in which living grape vines in a hot house in Salem were injured. (S. H. Scudder, Proc. Boston, N. H. S., vol. 7, p. 287). Now the earth in the hot houses here in Cambridge is largely

infested by white ants, but as far as I know, no destruction of plants has been observed. I was very much interested by the information from Mr. F. W. Putnam that in a garden in Irwing street living maples were largely infested by white ants. The evidence of the truth of this information was apparent by the first glance at the trees. They were three in number, some few yards separated, more than 60 feet high, two feet diameter at base, and apparently in good condition, except that the bark was in certain places affected or split. Those places had somewhat the appearance of the well-known winter splits of the bark of trees. In removing parts of the bark, directly living white ants, workers and a few soldiers, were found, collected, and proved to belong to *T. flavipes*. Closer observation showed that small open gangs, covered outside by the loose bark, ran along the tree to a height of 30 feet or more. There were on this estate no old rotten stumps, but some of the adjacent uninhabited estates contained them, where probably the nest may be found; nevertheless the whole estate was so overrun by white ants that they had made along the fence a long track covered with the hard clay-like mud with which they usually fill the eaten parts. As the boards of the fence were thin, it was perhaps judged safer to build the canal outside instead of on the interior of the boards. The house, a framehouse, about 10 years old, the stables and the wooden sheds were entirely intact. The estate near to it seemed to be entirely free of the pest. The foliage of the infested trees looked very remarkable. Mr. Sereno Watson, the curator of the Cambridge Herbarium, was at first at loss to determine the leaves; the size, the shape and the venation would not agree with any known species. But when he saw the tree, he was directly sure that it was only the common *Acer rubrum*. Some fresh shoots near the base of the tree had unmistakably the leaves of the common red maple. All the other leaves were very small, mostly not more than two inches broad, the midian lobe often short, sometimes blunt and not longer than the side lobes; the rips below were about yellowish and decidedly less dark than on the red maple. The owner of the estate had for ten years not observed any change in the foliage of the trees. During the last winter the upper part of one tree, some 20 feet, broke down in a gale, and proved to be not infested by white ants. Now it was considered safe to fell the whole tree. The bark was, in the place where the gangs went up along the tree, extensively bored and hollowed by the white ants. The wood itself was only two feet above the ground, filled with the common white ant holes and gangs, but no

more than one inch deep around the stump. The inner part of the tree showed the wood perfectly sound for 30 feet, except a perpendicular hole of two inches diameter in the middle of the tree, going down to the root. This hole, perhaps made by squirrels, had black ants as inhabitants. The two other trees are still standing. In consequence of those facts, I looked around in Cambridge, and have now the suspicion that perhaps the injury done to living trees may be less rare than I had supposed. If similar observations are made by entomologists, I would be thankful to have them communicated to me.

ON THE RELATIONS OF FUNGI TO GALLS AND TO LARVÆ OF CECIDOMYIA LIVING IN GALLS.

BY DR. FRIEDRICH THOMAS, OHRDRUF, NEAR GOTHA, GERMANY.

[This paper, an excellent addition to an excellent American paper by Mr. W. Trelease (Psyche, vol. iv., p. 195), is published in the Jrmischia, Vol. v., No. 1, p. 4, 1885. As it will be difficult for American students to have access to this periodical, I have translated the substance. Dr. Thomas has seen only the record of Mr. Trelease's paper in Botan. Centralblatt, xx., p. 356, by Dr. Ludwig.—H. A. HAGEN.]

Larvæ of Cecidomyia living in the spore-layers of Uredineæ are also found in Thuringia, Germany. In fact the discovery of the community in the same layer of two otherwise very different parasites is at first somewhat wonderful and startling. The right explanation will be a double symbiosis of a phanerogamous plant and of a fungus, and of a fungus and an entomozoon. Years ago I received from Gotha such larvæ out of the rust-fungus of Rosa. A similar manner of living is known in Germany for *Diplosis coniophaga*, Winnertz, and for *D. cæomatis*, Winn. Their larvæ were found by F. Loew in the rust-fungus of several plants (of Verh. Zool. Bot. Ges. Wien., 1874, p. 155). I am able to add two new facts. I found larvæ of Cecidomyia on *Vaccinium uliginosum* in the spore layers of *Thecospora Myrtillina*, Karsten (*Melampsora vaccinii*, Alb. et, Schn) on the Beerberg in the Thueringerwald. The other one was sent to me by Dr. E. Levier from Florence, Italy. The leaves of *Tanacetum balsamita*, L. (Erba'di Santa Maria) had in the *Puccinia Tanaceti balsamitæ*, D. C., many small, red larvæ of Cecidomyia. I am not of the opinion

that this guard is of prominent advantage for the plant. The enormous numbers of the spores of the rust-fungus wlll scarcely be diminished by these larvæ to any extent, that the guard may be considered to be a practical advantage for the plant.

The second point of interest in Mr. Trelease's paper is that the larvæ open the way for the fungus in the plants. I may state as an analogous fact, that here the pustulae and pocks on the leaves of Pomaceæ, made by Phytoptus, are not rarely filled by fungi, especially by the carbonized ones. The last plant I received by the late Alex. Braun, in 1877, from Blankenburg, Hartz., was a leaf of *Sorbus aucuparia*, with fungus immigrated in the galls of the mites.

A NOTE ON SOME HYDROPHILIDÆ.

BY GEORGE H. HORN, M. D.

Hydrophilus, as heretofore recognized in our fauna, contains two sets of species, the one series large, the other relatively small. They also differ in the form of the maxillary palpi and should properly be considered distinct genera defined as follows :—

HYDROPHILUS.—Terminal joint of maxillary palpi much shorter than the penultimate, the second joint long, arcuate. Claws toothed.

TROPISTERNUS.—Terminal joint as long or even longer than the penultimate, the second joint moderately long and straight. Claws not toothed.

The large species belong to the first series, and but two have appeared in our lists.

In the Biologia Cent. Am., vol. 1, pt. 2, p. 54, Dr. Sharp mentions two others as occurring in our faunal limits, *H. insularis* Cast. and *H. ater* Fab. The former has long been known to us, but has remained without name in our cabinets. The latter, which I have never seen, is quoted rather indefinitely by Dr. Sharp, " Philadelphia, Texas."

The species known in American collections are as follows :—

H. ovatus G. & H. *(ovalis* || Zieg.) Form more broadly oval, thorax more deflexed in front. Prosternal groove open in front. Abdomen opaque, densely finely pubescent, except a narrow space at the middle of the last three ventral segments.

The claws of the anterior tarsi ♂ are very nearly equal, the last joint about one and a half times the length of the four preceding joints and not broader than these, as is the case in the next two species. The tooth of the tarsal claws is much longer than in either of the foregoing species. This species is readily recognized It is less widely distributed than the others, but specimens are known to me from Pennsylvania, Missouri and Georgia.

H. triangularis Say. More elongate and narrower than either the preceding or next species. Prosternal groove closed in front. Ventral segments smooth and shining, except for a narrow space on each side, each segment with a conspicuous pale spot.

The male has the claws of the anterior tarsi very unequal, the anterior or outer being much larger and stronger, the last tarsal joint oblong, wider and a little longer than the preceding joints together, and much longer than wide.

This species occurs from the Middle States to Oregon, southward into Mexico.

H. insularis Cast. Larger than the preceding species and less slender. Prosternal groove closed. Abdomen smooth, the sides narrowly opaque, the yellow spots very indistinct or absent.

The male has the anterior claws very unequal, the last joint of the front tarsi as long as the preceding four, broadly triangularly dilated, slightly broader than long.

When once the form of these two species is fixed in the eye, there is no difficulty in distinguishing them independently of the male characters, which are very obvious.

This species is known to me from Texas and Arizona. It extends to Guatemala, and occurs also in the Antilles.

Tropisternus apicipalpis Chevr. This species should be added to our lists. It is much larger than our other species and more narrowed posteriorly. The terminal joint of the maxillary palpi is a little shorter than the preceding, thereby approaching Hydrophilus. The last ventral segment has a strong spiniform crest. It is more nearly related in our fauna to *glaber* and *mixtus*, and differs from both not only in its larger size and by being more narrowed posteriorly, but also by the middle and hind femora being very dissimilarly punctate.

Occurs in Arizona, the peninsula of California, and in Mexico.

Berosus Salvini Sharp, Biol. loc. cit. p. 79. This species also occurs in our fauna. It belongs to the same series as *punctatissimus* and resembles it, but is rather more elongate, the sculpture smoother and the apical spines of the elytra more prolonged.

Occurs in Texas and Mexico.

BOOK NOTICES.

Report of the Dominion Entomologist for 1884.—Department of Agriculture, Ottawa.

A long felt want has at last been supplied in the appointment of a Dominion Entomologist, and a well qualified expert selected for the work, Mr. James Fletcher, whose preliminary report is before us. His appointment was made so late in the season that he has been unable to do more than furnish a brief report, in which reference is made to the organization of the department under his charge and the measures taken to interest all those engaged in agriculture and horticulture in the work. Following this is a report on the quality of the Paris green found in the market, with results of the analysis of six samples; also reports on insects injuring grain crops, hay and clover, peas, root crops, fruits and forest trees; altogether a useful review of the chief injuries caused by insects to these several crops during 1884. We sincerely congratulate Mr. Fletcher on the good work thus far done, and earnestly hope that he may be able to carry to a successful issue the plans laid out for the present year.

Eighth Report of Observations on Injurious Insects and Common Farm Pests, with Methods of Prevention and Remedy, by Eleanor A. Ormerod, Dunster Lodge, near Isleworth, England; 8 vo., pp. 122, with 39 cuts. Published by Simpkin, Marshall & Co., Stationers, Hall Court, London, England.

We are much indebted to the talented authoress for a copy of this valuable report, which is in no respect behind its predecessors. In the preface reference is made to the relations of birds to insects, wherein the sparrow is condemned very strongly. Its habit of driving away other and more useful birds, together with its grain-feeding propensities, are fully recognized in England as well as in this country, and fairly entitle it to be regarded as an enemy rather than a friend. More extended reference is made to this subject in a chapter headed "Birds, Depredations of Spar-

rows." The insects which have proved injurious to the following fruits, vegetables, trees, etc., during the past year, together with the best methods of preventing their ravages, are also treated of in the following order: Apple, beans, cabbage, carrots, corn and grass, gooseberry, hop, mangold, oak, onions, parsley, pine, potatoes, raspberry, turnip and willow. The report also contains chapters on marsh snails and the ox bot-fly. Miss Ormerod has succeeded in awakening much interest in England on the subject of injurious insects, and by her careful observations and experiments has conferred lasting benefits on the agricultural community.

CORRESPONDENCE.

Dear Sir: On page 113 of the present volume I stated erroneously that in neither of Mr. Scudder's lists of food-plants was willow attributed to *P. Turnus*. In "Butterflies," p. 309, willow is given. It is however an exceptional food-plant. W. H. EDWARDS.

COELOPA FRIGIDA, FALLEN.

Dear Sir: The occurrence of this fly (which is common along the shores of northern Europe) in N. America, was known long ago. It is always found where *Fucus vesiculosus* abounds. Nevertheless its previous stages seem to be still unknown, and it is the intention of this note to draw attention to this fact and to invite readers to fill this gap. Mr. J. H. Sears, of Salem, Mass., collected the flies in tide pools at Marblehead, Mass., Nov. 30, 1884. In 1877 I received a large number raised in the cellar of the chemical laboratory of Harvard College, Nov. 6. There had been stored a large quantity of fresh sea weeds for chemical examination. I think it is to be supposed that the larva lives not only in the dry dead sea-weed, but probably also in the living. The species would then be an addition to our known marine insects. After Zetterstedt, this species is identical with Doumerc's *Psallidomyia fucicola*, but I cannot consult this paper. Schiner, vol. ii., p. 319, says, *Metamorphosis ignota.* I would be glad to be informed about the previous stages of this species, or—if they are published - to know the author. What is known about the previous stages of the Diptera has not yet been collected, and is so scattered in different papers that it is very difficult to find if the metamorphosis of a given species is known and published.

H. A. HAGEN, Cambridge, Mass.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., AUGUST, 1885. No. 8

MONOGRAPH OF THE EMBIDINA.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Oligotoma Cubana*, n. sp.

Olyntha? spec. larva. Hag. Synops. Neur. N. Amer., p. 7.

Olyntha Cubana, larva, imago, Hag. Psoc. Embid. Synops. Verh. Wien. Z. B. Gesell. 1866, p. 221, 223 (no description).

Olyntha Cubana, McLachl. Linn. Soc. Jour. Zool., vol. xiii., p. 381.

Male, dry. Length of body about 8 mill.; exp. of wings about 12 mill. Head light brown, little longer than broad, narrowed behind the eyes, convex above, without any impression, rounded at the sides, cut straight near prothorax; labrum large, paler, rounded; antennæ pale brown (only 13 joints present); 1st large, cylindrical; 2nd very short, as long as broad; 3rd as long as 1st, thinner, somewhat thicker at tip; all following similar but a little shorter; antennæ and head densely clothed with very pale hairs; maxillary palpi 5-jointed, pale brown, apical joint long, conical; labial palpi small; tip of mandibles black. Prothorax light brown, narrower than head, somewhat enlarged to the mesothorax, one half longer than broad, flattened; before the apical third with a transversal sulcus; legs brown, paler on articulations; fore legs with tibia and 1st joint of tarsus enlarged. Wings narrow, faintly rugose, very pale brown, with five longitudinal white bands; radius yellowish; sector bifid; five transversals between the upper branch and the radius. Abdomen long, brown, hairy; appendages long, slender, hairy. The specimen is carded, and the parts not very discernible. If there is a difference, the basal joint of the left appendage is larger, and the apical joint of the right appendage is longer; between both above a short bent process, and on the left side of it a conical lobe, short, open at tip.

Hab. Cuba. The only specimen I received May, 1865, from Prof. Poey. It is No. 8 of his catalogue, and was named as *Olyntha* probably

after the notice in my Synopsis, p. 7, where a larva from Cuba was mentioned as perhaps belonging to *Olyntha?* I think the specimen, when caught, was young; it can not be decided if the colors are fully developed; it is carded and in a delicate condition. It is of the size of *E. Salvini* McLachl., dut directly to be recognized as a different species by the bifid sector of the wings.

Oligotoma Cubana,

Female? about 7 mill. long; dry. Head light brown, sparingly clothed with pale hairs; shape of the male; antennæ brown, densely clothed with pale hairs, 18 jointed; 1st stout, longer, 2nd very short, 3rd longer, all the following shorter, equal; the last one pointed; palpi as in the male; prothorax similar to the male, light brown; thorax and abdomen blackish brown (by exsiccation); meso and metathorax nearly equal, oblong, without any trace of wings; legs dark brown, articulation and tarsi pale; last ventral segment of abdomen not divided, lightly rounded on tip; of the appendages only the left one is present, but the tip of the apical joint is broken; the basal joint is not dilated; above, between the appendages, is a small, thin. elongated lobe.

Hab. Cuba; only one specimen carded and in bad condition, No. 136 of Gundlach's catalogue was received in 1866. If Mr. Wood-Mason's statements are to be accepted, it can be the female to the male described before. Should it be a female larva, which I scarcely believe it to be, it must belong to another and much larger species. The small larva quoted in my synopsis, p. 7, 4 mill. long, from the Museum in Berlin, was also received by Gundlach from Cuba. Probably it belongs to the same species, and is a larva.

2. *Oligotoma Hubbardi*, n. spec.

Length of the body 4 mill.; length to tip of wings 6 mill.; exp. of wings 8 mill. Male dry: Head very light brown, shining; on the sides very sparingly clothed with pale hairs; convex above, slightly narrower behind the eyes, which are black and comparatively larger than in *O. Cubana*, and less distant one from the other above; the part of the head behind the eyes a little broader than long, rounded behind, cut straight before the prothorax; antennæ (5 basal joints present) pale brown, densely clothed with pale long hairs; 1st joint short, cylindrical, scarcely longer than broad; 2nd very small, thinner, annular; 3rd as long as the two

basals, thicker on tip; 4th and 5th similar to 3rd, but a little shorter; prothorax very small, much broader near the wings, divided by an anterior transversal sulcus; legs as in *O. Cubana;* wings very delicate (probably the specimen has been in alcohol, as the wings are crumpled) pale; venation as in *O. Cubana*, sector bifid; transversals not well visible; only indications of the white bands; abdomen pale brown; appendages broken. From what is to be seen of the tip of abdomen, the specimen is a male.

Hab. Entreprise, Florida, May 24, by H. G. Hubbard, to whom the Museum is greatly indebted for interesting specimens and other beautiful biological discoveries.

This is, as far as I know, the only specimen of an Embid collected in the U. S. It is in bad condition, and the description will have to be completed from other specimens. Though the species is obviously related to *O Cubana*, I believe the differences noted in the shape of the head and the antennæ, and the remarkably smaller size, justify the consideration of *O. Hubbardi* as a different species, till the contrary is proved. Difference in size has been noted, but never to such an extent. I possess only of one species eight specimens, which show differences in size, but only small ones.

3. *Oligotoma insularis.*

O. insularis McLachl., Ann. Mag. N. H., 1883, vol. xii., p. 227.

Length of body 8 mill.; exp. of wings, 12 mill.

Male, in alcohol: Body pitchy-fuscous, clothed with fine whitish pubescence; head a little longer than broad; sides oblique; occiput half as broad as the front part; eyes black, a little more distant one from the other than its diameter; in the middle, a little before the eyes, a small transversal impression, perhaps homologous to the obliterated ocellus in *Blatta* and *Termes*. Antennæ (only 10 joints present) fuscous, the articulations pale, whitish; 1st joint stouter than the others, a little longer than broad; 2nd very short, annular; 3rd twice as long as 2nd, a little larger on tip; 4th and 5th shorter than 3rd; 6th as long as 3rd, the following ones longer, more enlarged on tip; mouth-parts a little paler; maxillary palpi fuscous, articulations pale, apical joint ovoid, longer than the other ones, which are of equal length; labial palpi similar, apical joint ovoid, longer than the two basals. Prothorax oblong, as broad as the occiput, a little longer than broad, on each side notched after the transversal sulcus. Legs pitchy-fuscous, the articulations and tarsi pale,

except the enlarged basal joint of the fore legs, which is pitchy-fuscous. Abdomen pale dirty brown ; the ventral ganglions very visible ; last ventral segment dark brown, strong, ending in a bottle-shaped tube, somewhat contracted before its round opening ; this tube is turned to the left side and partly surrounded by a horny hook originating between the left appendage and the tube, on which it is laying somewhat in the shape of a cornucopia. On the right side near the right appendage is a similar hook, but larger and more dorsal, as long as the tube ; the basal half of it forms a spoon-shaped lobe, the apical third is analogous to the left hook, the tip bent up sharply ; before tip inside a kind of blunt tooth ; appendages long, the apical joint as long as the basal ; the left appendage has the basal joint perhaps a little thicker at base ; there is very little asymmetry if at all, in the appendages.

Wings narrow, pale fuliginous ; radius dark fuscous, venation fuscescent ; sector bifurcated, four transversals between its upper branch and the radius ; three costals in the apical half of wing, the last one best defined ; there are five longitudinal whitish bands in the wing.

Hab. One specimen from Honolulu. Mr. Hoffman, who owns a very large botanical garden there, containing many species of palms and orchids, had given orders to collect insects in his greenhouses. Among this miscellaneous lot was one *Oligotoma*. McLachlan's description is made from three carded specimens from the Hawaiian Islands ; though it is difficult to compare dry and alcoholic specimens, it seems to be very probable that my specimen is *O. insularis*. The only difference of importance, the shape of the prothorax, may be the effect of exsiccation. A specimen from Antigua, in McLachlan's collection, is so similar to *O. insularis* that he hesitates to separate it therefrom. Perhaps the latter may be *O. Cubana*. Finally, a richer material will have to decide if *O. Cubana* is really different from *O. insularis*. The only specimen of the latter species before me is more delicate, the wings narrower, the colors much darker, the prothorax larger and different. It could have been imported into the Sandwich Islands with plants, just as other American insects.

4. *Oligotoma Saundersii*.

O. Saundersii, Westwood. Trans. Linn. Soc., vol. xvii., p. 373, pl. 2, f. 2.

O. Saundersii, Burm. Hde., vol. ii., p. 770.

O. Saundersii, Walker. List. Neuropt. Br. Mus., p. 531.

O. Saundersii, Wood-Mason. Contrib. Embid. Proc. Zool. Soc. Lond., 1883, p. 628-634, pl. lvi., f. 1-5.

O. Saundersii, Conry. Ascension Isl. Zool. Ann. Mag., N. H., 1881, vol. viii., p. 346.

Embia Latreillii, Ramb. Neuropt., p. 312-2.

E. Latreillii, Lucas. Ann. Soc. Ent. Fr., 1883, vol. iii. Bullet, p. cvi.

The species was described fifty years ago by Westwood : " Lutescenti-fuscescens, incisuris abdominalibus dilutioribus, alis pallide fuscescentibus, vittis 5 angustissimis albis longitudinalibus inter nervos longitudinales positis." The only known specimen from Bengal, formerly in W. Saunders' collection, belongs now to the British Museum. Burmeister, who had not seen the specimen, changed the color to " testaceofuscescens," which was copied by Walker, though the type was accessible to him. Rambur remarks that he had separated his *E. Latreillii* with 18-jointed antennæ from *O. Saundersii* with 11-jointed antennæ, only for this difference. I believe that McLachlan is perfectly correct in assuming the antennæ of the type imperfect and the identity of both species doubtless. (Journal Linn. Soc. xiii., p. 379.) He remarks, l. c., " in some examples there is a slender spiniform process between the articulate side processes (appendages) ; in *O. Saundersii* this spiniform process has a small tooth before the apex on the lower side. I do not see the process in all the examples, hence it may perhaps be sexual, and possibly is the intromittent organ." (McLachl.)

The 8 alcoholic specimens before me show all this process on the right side, but on the left side is a similar process, which in dry specimens is not well visible. Between both the last ventral segment is protruded asymmetrically to the left in a bottle-shaped cone, with a round aperture on tip. This is as in some Perlids and Phryganids the opening of the ductus ejaculatorius, representing the intromittent organ ; the spines or similar organs have the purpose to open the female valves and to keep them in place during copulation. In *O. Saundersii* these spines viewed from beside are small bands, rounded on tip, with a small hook outside before tip ; this hook is wanting on the left spine, which is also in other species more or less asymmetrical.

McLachlan has not described *O. Saundersii*, but he notes (by *O. insularis)* that the body is testaceous.

Mr. Wood-Mason found in July at Jubbulpore, E. India, a number of larvæ on a sandy spot, which were determined by McLachlan, Proc. Ent. Soc., 1879, p. 53, as possibly belonging to *O. Saundersii*. They show not the slightest traces of wings, although the asymmetry of the caudal appendages is quite apparent. Later winged specimens, being undoubtedly *O. Saundersii*, were captured; all were males of the same uniform brown color. The male sexual characters of alcoholic specimens are described. The abdominal asymmetry is carried to an extreme; not only are the caudal appendages unequal on the two sides, but the tenth dorsal and the ninth ventral segment also depart widely from symmetry, especially the former, which is incompletely divided by a deep angular notch into two unequal and greatly dissimilar parts (Wood-Mason, l. c., p. 632). The wings are described and figured in detail.

This is in fact all known about this species, except the communication by Mr. Lucas, to be recorded later. I received from S. E. Borneo eight specimens, collected in September and December. All are winged males. Their different color induced me to name them as a new species, *O. Borneensis*, especially as mine are well preserved in alcohol, and Wood-Mason's, of the same uniform brown color, were also in alcohol. Thirty years ago I twice studied the type of *O. Saundersii*, which was in good condition, and also the type of *E. Latreillii*, Ramb. As I do not find my notes, I believe it more prudent to unite the Borneo specimens with *O. Saundersii*, the more so as Rambur's description agrees.

Male imago: Length, with wings, 7-10 mill.; exp. of wings 11-16 mill. Head little longer than broad, behind the eyes rounded, about semi-circular; lightly convex above, hairy; yellowish-orange, the front part to behind the eyes dark reddish brown; clypeus pale; labrum pale, with a large brown middle-spot; max. palpi brown, articulations pale, the two apical joints a little longer than the three basals together; these are equal, as long as broad; apical joint ovoid, a little longer than the preceding one; labial palpi similar in color, apical joint ovoid, larger and a little longer than the two basals together. Antennæ much longer than the head, reaching the metathorax, densely hairy, 19-jointed (only one specimen has so many joints), brown, articulations paler; basal joint blackish, a little thicker, cylindrical; 2nd very short, 3rd longer than 1st, ob-conical; the next two or three joints equal, shorter than 3rd; all the rest as long and thick as 3rd. Prothorax much narrower than the head, longer than broad, with a transversal sulcus after the apical third, where the sides are

notched; yellowish, paler than the head; the other parts of the thorax and the abdomen more or less dark fuscous, with paler articulations. Legs fuscous, the articulations, the tarsi except of the front legs, and beneath paler. Wings fuliginous, villous, with five longitudinal narrow white bands; sector bifid; in the cell four to two transversals, and mostly two between the costa and the end of the cell. Appendages fuscous, stout, two jointed, of equal length, hairy; basal joint of left appendage much thinner at base and strongly enlarged on tip internally; basal joint of right appendage stout, cylindrical. The last dorsal segment somewhat cleft and deeply notched from the middle to the right side margin; in this place is inserted, with a largely inflated base, somewhat above the right appendage, a brown spiniform process; viewed from above the base is membranaceous paler; the process is horny, long, narrow (viewed from sides, rounded on tip), bifid at base, going outside of the membranaceous base, and sending the branch to the inner side; the inner branch and the process form a crescent, which is filled with a pale membrane, which on tip goes outside upon the process and forms a small sharp tooth; near the left appendage is a similar horny process, but without an inflated base, originating directly from the apical border of the segment; this process is shorter, a small lobe, similar to the other, ending (viewed from above) knife-shaped; between and beneath these processes is the last ventral segment produced in a cone, turned to the left side, with a round open aperture on tip.

Mr. Lucas, l. c., has given a very interesting note concerning the larvæ (?) and the habits of *E. Latreillii*. As Mr. Lucas, at the time of his publication, could not have had knowledge of Mr. Wood-Mason's article, it is still uncertain if the so-called larvæ were really larvæ or females. As Mr. Lucas has not recorded the number of joints of the antennæ, nor the asymmetry or symmetry of the appendages, we should better wait to express an opinion till these gaps are filled. The size of the larva is just the same as the male imago (8-10 mill.), therefore too small for a female, if Mr. Wood-Mason's suggestion is correct. The last dorsal segment is said to have a "petite fossette longitudinale," which would agree only with the male. The detailed description of these larvæ agrees well with *E. Latreillii*, and as the author has found among them the winged (male) imago, it will probably be that the described wingless forms were larvæ of the male. They were found by Mr. G. A. Foujade among the detritus of Cycas sent from Madagascar to the Museum of Paris. Larva and imago

live near the base of the leaves of Cycas, concealed in silken tunnels, woven by larvæ and imago. Mr. Lucas believes that this is the only instance known, that full grown imagos possess the power of spinning webs with the mouth; but the same fact is recorded long ago by P. Huber (Mem. Soc. Physiq. Genève, 1843, vol. x., p. 35-47) and other observers for *Psocus*. This faculty of spinning speaks for a relationship of Embidæ and Psocidæ.

Hab. Bengal, the type of *O. Saundersii;* Jubbulpore, between Bombay and Calcutta, end of July, 1879, and Calcutta, flying to the light in the dining-room, by Wood-Mason. *E. Latriellii* is recorded from Bombay, Mauritius Isl. and Madagascar; from Borneo, near Tumbang-Hiang, Sept., 1881, and from Telang, Dec, 1881. Both localities are in the south eastern part of Borneo. The insects were collected by Mr. Grabowsky. Both lots are in alcohol, and the specimens collected in December have exactly the same colors as those collected in September; all are winged males, and apparently identical with *E. Latreillii*. Perhaps the Calcutta specimens of *O. Saundersii* belong to the same species (McLachl. Record, 1883, Ins., p. 259), nevertheless the statement "all of the same *uniform* brown color," is rather suspicious. Mr. Corny, l. c., says that *O. Saundersii* is doing much mischief in Ascension Island; it is to be regretted that not more of the kind of mischief is recorded. The distribution of the species is a wide one; the habits of the species are only recorded by Lucas. In Jubbulpore Wood-Mason recorded them running actively by dozens (all male larvæ) on a bare and sandy spot, beneath old bricks, or openly. A violent thunder storm prevented the examination of the nest or tunnels inhabited by the insects. Mr. Westwood, l. c., p. 374, has seen a small apterous specimen of a dark brown color with a fulcous head, collected by R. Templeton on the Island of Mauritius. Probably it belongs to *E. Latreillii*.

5. *Oligotoma Michaeli.*

Embia spec.—Michael, Gardener's Chronicle, No. 157, vol. vi. (n. ser.) December 30, 1876, p. 845, fig. 156, orchid root eaten; f. 157, Embia magnified, antenna; f. 158, details of the structure of Embia; follows a notice by Mr. J. O. Westwood.

McLachlan, Gard. Chronicle, in a following number.

Oligotoma Michaeli McLachlan, Journal Linn. Soc. Lond. Zool., vol. 13, p. 373-384, pl. xxi.

Oligotoma Michaeli Wood-Mason, Proc. Zool. Soc. Lond., 1883, p. 630, pl. lvi., f. 6, female.

Mr. Michael, of Highgate, England, an extensive grower of exotic orchids, discovered in 1876 that a large mass of *Saccolobium retusum*, purchased from a London nurseryman, was apparently damaged by some insect, and examination revealed the presence of numerous Embidæ on the roots, concealed in silken tunnels. A winged example was unfortunately lost. More specimens were found in the nursery whence the plants were obtained. Mr. Michael gave an account of the discovery, illustrated by magnified figures, and accompanied by notes of Prof. Westwood, in which a doubt was implied as to the damage to the orchids being occasioned by the Embidæ. Mr. McLachlan, l. c., stated that Prof. Westwood's doubt appeared to be well founded. But the sequel proved, tolerably to his satisfaction, that the insects had eaten the roots to some extent. About the same time he received from W. A. Forbes a full grown larva without traces of rudimentary wings. Mr. Michael's figure shows a larva with only short rudimentary metathoracic wings, and McLachlan supposes that the mesothoracic pair may have been accidentally destroyed. McLachlan describes the species as *Oligotoma Michaeli*, and figures larva, nympha and imago. I should remark that all the foregoing is copied from McLachlan's excellent paper, though I have myself compared the quoted communications. Mr. Wood Mason, l. c., found in October, 1880, in the large plant house in the Botanic Gardens in Calcutta, a large wingless Embia crawling over the leaves of a plant, which he describes carefully and declares it to be the long sought for female. He does not give its name, except in the explanation of the plate, p. 634, where the figured abdomen, f. 6, is stated to be Embia *(O.) Michaeli.* He speaks, p. 631, of a black winged specimen different from his *O. Saundersii* collected in Calcutta, but he gives no description nor a name. I have received by Rev. C. C. Carleton, from Amballa, *E. India*, a female apparently identical with those described by Mr. Wood-Mason, and a small black-winged male. Both were in alcohol, together with numerous other insects, without any notes concerning their habits. I presume the male to be *O. Michaeli.*

McLachlan's descriptions are as follows :

Male, imago: Length of body 10½ mill.; exp. of wings, 18.

Deep black, somewhat shining ; antennæ 24-jointed, the five apicals yellowish ; legs black, knees and tarsi somewhat testaceous ; append-

ages black, long, very asymmetrical; the right with the basal joint very broad, nearly quadrate; the left slender, and fully twice as long; a slender process with piceous apex from the base of the right appendage; ventrally is a large triangular projection of the last segment, concave above; wings dark smoky fuscous, with four very narrow longitudinal lines; 4–5 pale costal veinlets and three between the radius and the upper branch of the sector.

A well-grown larva is 12 mill. long; antennæ much shorter than in the imago; lurid-fuscous, the posterior portion of the head, the whole prothorax and legs more or less testaceous; underside pale; appendages with just the same asymmetry as in the imago. A starved nymph 9 mill. long; colors similar to those of the larva; legs more slender, asymmetry of caudal appendages less striking; rudimentary wings with evident neuration; fore wings reaching the base of metanotum; hind wings the apex of 2nd dorsal segment; the nymph when living was at least one-third longer. Hab. Among plants of *Saccolobium retusum* from East India in hothouses.

The three stages are described after single specimens. The color of the larva reminds strongly of the specimens from Borneo, described before as *O. Saundersii.* The figure of the nymph in the Gardener's Chronicle complicates things more. The hind wings cover only the anterior half of the metathorax, therefore the specimen was much younger than those described by McLachlan, in which the hind wings reached the apex of the second abdominal segment. Nevertheless the size marked in the Gardener's Chronicle is 16 mill., though McLachlan's when living, was only 12 mill. The figure (Gard. Chr.) shows on the hind part of the head and thorax spots and patches similar to those in Sialis and Corydalis. Mr. Wood-Mason speaks in several places of *O. Michaeli* as if he knows thls species, and finally described and figured (only the abdomen from below) *O. Michaeli.* Nevertheless his paper does not allow conclusions with certainty. The black male mentioned by him can only with doubt be united with *O. Michaeli,* as he does not mention the yellow apex of the antennæ; in fact he has not named it at all. The female, of which I possess a specimen, seems rather gigantic compared with the described male, so that I had provisionally described it as *O. valida.* But as McLachlan (Zool. Rec., 1883, p. 259) by the words in brackets, "apparently *O. Michaeli* McLachl.," accepts this determination, I have followed him not to encumber synonymy.

Female: Length of body 18 mill.; breadth 2 mill. Head nearly circular, convex above, blackish fuscous, reddish in the centre, densely covered with short reddish hairs; eyes very small, below and a little behind the antennæ, scarcely visible from above, kidney-shaped; facets less numerous, smaller and not convex, as in the males; indeed the eyes of the female are compound, flattened eyes, though those of the males are nearly aggregated eyes; clypeus short, transversal, somewhat reddish; rhinarium large pale membranaceous; labrum large, rounded, light brown, darker in middle; maxillary palpi very pale brown, the two last joints longer; labial palpi same color, last joint longer; head beneath, blackish, fuscous reddish in the middle; mentum transversal, quadrangular blackish fuscous. Antennæ (only 21 joints present) short, perhaps as long as the head, blackish fuscous, hairy, articulations pale; 1st joint thicker than the others, cylindrical, less than twice as long as broad; 2nd as long as broad, 3rd very little longer, 4th to 6th very short, annular; the seven following alike, about globular, the rest longer, ovid. Prothorax about as broad as the head, quadrangular, a transversal sulcus after the apical third, and a smaller one on the base; mesothorax about twice as long as broad, a transversal sulcus near the base; metathorax as long as broad, quadrangular; no traces of wings; the 10 dorsal segments of abdomen alike, a little shorter than broad, except the last one, which is longer, rounded on tip, obtuse, deflexed at the end. The first 6 ventral segments alike, half as long as broad; 7th shorter, the apical margin widely emarginated, the middle forming a small transverse-oval plate, behind which is to be seen the large genital aperture in the articulation of the segments; 8th segment a little longer; 9th split longitudinally in two lobes for the anus. Thorax and abdomen shining black and remarkable for its thick and firmly chitinized integument; below a little paler, brownish, and as commonly the nerves of the chorda ventralis can be recognized through the integument. Appendages symmetrical, two-jointed, cylindrical, apical joint a little longer and thinner; blackish fuscous, pale on articulations, femora and first joint of fore-tarsi strongly enlarged; middle legs less strong and smaller; the inflated 1st joint of the tarsus of fore legs with an external apical black spine, longer than the 2nd joint.

Hab. Amballa, *E. India*, by Rev. C. C. Carleton, one specimen in alcohol. There can scarcely be any doubt that it is the female of *O. Michaeli* described by Mr. Wood-Mason. The difference of the situation of the genital aperture at the base of 8th segment (he says the 9th) is only

seemingly, as he counts the "segment médiaire," of which he says, p. 630, "its sternum appears to be undeveloped." He calls the antennæ pale-tipped. Perhaps this belongs, as in the male, to the apical joints, which are wanting in my specimen.

It is doubtless true that the specimen just described is a female, as Mr. Wood-Mason has well proven by the location of the genital aperture between the 7th and 8th ventral segments; also that it is a full-grown female, as proven by the firmly chitinized integuments. How Mr. Wood-Mason arrived at the previous conclusion, that the females of Embia would be apterous, I do not know; though his supposition that the female would be probably larger in size, was justified by related families. In accepting solely on the high authority of Mr. Wood-Mason and Mr. McLachlan that this female belongs to *O. Michaeli*, it seems important to point out the differences of the male (after the description and figure by McLachlan) and the female.

1. The difference in size is very great, body of the female being at least one third longer, and half broader.

2. The female is perfectly wingless; no traces of rudimentary wings to be found at the anterior angles of the two thoracic segments. There seems to be indeed at the anterior angles a little below the dorsal plate, a very small hyaline membranous sac, but the insufficient material at hand would not justify the accepting of these sacs as traces of aborted wings.

3. The difference between the eyes of the male and the female is very striking, though not noticed by the author. The male has large eyes, prominent on the sides of the head, very visible from above, kidney shaped, and the socket of the antennæ placed in the emargination; the facets are globular. The female has the eyes much smaller, scarcely visible from above, below and behind the antennæ, from which they are wider separated; the hind part of the eye is about half broader than the front part; no inner emargination exists; the facets are smaller and flattened. The eyes of the male are more like aggregated eyes (Stylops), the eyes of the female are like the common compounded eyes of insects. The consequences of these differences are very visible in the shape of the head. The largest diameter of the head of the males is situated between the eyes; behind them the sides of the head slope down to the occiput. The head of the female is nearly orbicular, or at least very shortly ovoid. A sexual difference of the eyes does not exist, as far as known to me, among the Perlids, but very often in Psocids and Ephemerids.

4. The antennæ seem to be shorter and the joints partly more globular in the female, a character not uncommon among the Psocids.

5. The difference of the meso- and metathorax among the sexes is not much marked, owing probably to the fact that the wings of the male imago are inserted with a very narrow base, which gives a very fine membranous fold farther down along the sides. The sternum of each of the three segments of the thorax is divided in three parts. The segment médiaire is the last part of the metathorax, and the dorsum of this segment belongs to the metathorax. The abdomen has only seemingly 10 dorsal segments.

6. The apex of the first tarsal joint of the fore legs of the female has an external spine, longer than the second joint, conical, very sharp. I have not yet fouud such a spine in any male.

7. The anal appendages of the abdomen are symmetrical in the female ; asymmetrical in the male, similar to Blatta. I do not know that a similar asymmetry exists among Pseudoneuroptera.

I am at a loss to understand where the larva described, p. 384, fig. 1, by McLachlan, belongs. The whole figure represents well a younger female only 12 mill. long, except that the eyes are a little larger and more visible from above. The description states, "just the same asymmetry as in the imago." This would indicate a positive difference. But there is not to be seen in the figure any asymmetry, and the segment before the last seems to be shorter. The description mentions not the ventral parts, which would be deciding. If it is not a female—and it can hardly be assumed that younger females should possess asymmetrical appendages—it can not be a male larva, being longer than the largest male imago, and not showing the slightest traces of wings. Perhaps a new examination of the type will solve the question. I can not accept the starved nymph, p. 384, fig. 2, as a nymph. The wing cases of nymphæ in Orthoptera (and Pseudoneuroptera) are always more or less connected at base, and never entirely free as in the figure. Perhaps the specimen represents a so-called short-winged form, which occurs not uncommonly among Perlids, Psocides and Termites. The figure in Gard. Chronicle (fig. 157) would represent a female (the external spine of the first tarsal joint of the fore legs is visible) if the wing sacs of the metathorax were not so well marked.

There is apparently more detailed information needed on *O. Michaeli*. As the large orchid growers here are accustomed to buy their East Indian species mostly from London nurseries, I have taken steps to ascertain if any Embids have been imported with the plants.

Male imago : Length 8½ mill ; exp. of the wings 12 mill.

There is before me one specimen from Amballa, *E. India*, by the same collector, Rev. C. C. Carleton. It did not arrive in the same lot with the female, but several years before in alcohol, together with many other insects. The very large discrepancy in size of the female, and the considerably larger size of the male described by McLachlan, though his specimen was dry, together with some differences with the description, seemed to justify my specimen as a new species, perhaps identical with the black one from Calcutta, mentioned without description by Wood-Mason. Nevertheless, some of the differences may be the result of the drying up of the specimen described, and therefore I decided to accept the specimen as a small *O. Michaeli* till the contrary is proved. It differs as follows from McLachlan's description :

There is no large, nearly circular, shallow depression on the disc of the head above ; but between the eyes is a short engraved furrow, similar to an aborted ocellus. Antennæ brown with paler hairs, instead of black with black hairs ; what remains, 17 joints, is considerably longer than the head and prothorax together ; shape of joints as in the description; I do not know if the five apicals were yellow, ; when I figured years ago the details of the specimen, and counted 21 joints, I did not note in the description that the two last joints were yellow. The pronotum is not nearly twice as long as broad ; after the straight front margin and transversal sulcus, there follows a somewhat diamond-shaped elevation, and the base after it is membranous. Legs, wings and veins as in the description ; the only black vein is the subcosta, which, as Wood-Mason justly remarks, is not coalescent with the radius ; all other veins are brown. The wings have indeed five white longitudinal lines, only the first one behind the costa is very narrow. Appendages long, asymmetrical, brown, with long black hairs, the basal joint of the right one long, broad, straight, but by no means nearly quadrate, as in the decription ; the left is a little longer, slender, thinner at base, curvated ; the apical joints alike, cylindrical, straight, about as long as the basal joint. The last ventral plate is asymmetrical ; somewhat more to the right originates with a larger base a cylindrical tube, straight, but turned a little to the left ; shortly before its apical opening it is a little constricted ; between it and the right appendages is a slender process, as long as the tube, cylindrical, its apical half thinner, tip pointed ; on the left side, between tube and appendages, is a process with thicker membranous base, the apical half slender, much

twisted, sharp on tip, much shorter than the tube. I believe it probable that the difference mentioned may be explained from the fact that McLachlan had before him only a dry specimen, and I only one in alcohol. As soon as this species can be more easily got for study, we may hope to have detailed descriptions from a larger material.

DESCRIPTION OF THE LAST LARVAL STAGES AND CHRYSALIS OF MELITAEA RUBICUNDA, H. Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

On 13th Sept., 1884, I received from Mr. James Fletcher 22 larvæ in hibernation, part of a lot sent him shortly before by Rev. Geo. W. Taylor, of Victoria, V. I. The larvæ, on exposure to the light, moved about, but refused to eat Chelone glabra. I placed them in cellar, and in October forwarded to Clifton Springs, N. Y., with larvæ of other species, to go in the "cooler." On 7th March, I received them again, and found about one half to be alive. These I put in the ice house till I could get leaves of the food-plant. In last days of April they were brought to the house and given Chelone, the living larvæ now being reduced to six. On the third day, I noticed that the leaves had been eaten, and three or four days later the larvæ looked healthy and had recovered the length and diameter which they had on 13th Sept., larvæ always shrinking much during hibernation. The description then taken is as follows :

After supposed third moult: Length $\frac{4}{10}$ inch; cylindrical, rather thickest in middle, and tapering equally to either end; color black and gray-white; a mid-dorsal band of the latter color, cut longitudinally by a black line; then a broad black band reaching to middle of side, dotted with gray on the tops of the cross-ridges; below this to base about equally black and gray, sprinkled and mottled; the spines arranged as in the allied species, there being seven principal rows, one dorsal, and three on either side, besides a row of minute ones along base; these upper spines are rather long, broad at base and taper to a blunt top, and are beset thickly from base to top with long black hairs; the dorsal row spring from large orange tubercles, and for a little distance above are orange, the rest black; the other rows have black tubercles and the spines are black,

except that in the lower lateral row, from 6 to 10, there is a little orange on the outer side of each tubercle; the small spines of row along base are orange, from orange tubercles; segment 2 has a black chitinous dorsal collar on which are many small black spines, with hairs; feet black; pro-legs black, the last joint yellowish; head ob-ovoid, flattened frontally, depressed at suture, the vertices rounded; color dull black, the surface rough, thickly covered with long black hairs.

On 2nd May, one larva passed the first moult after hibernation, the supposed fourth moult. At 24 hours from the moult: length $\frac{5}{10}$ inch. By 10th May, this larva had reached maturity.

MATURE LARVA.—Length .9 inch; cylindrical, thickest in middle; color black, with a slight dorsal band of gray-white, made up of white tubercles on the cross ridges, and a heavier band of same color along lower part of side, the black area between the two being thinly dotted white; the spines long, stout at base, tapering, and thickly beset with long black hairs; those of dorsal row black at tips, the rest and the large basal tubercles, yolk-yellow; those of the other three rows black, the bases black; the small spines along base of body yolk-yellow on 6 to 10, the rest black; on 2 a chitinous collar with many small black spines with hairs; feet black, pro-legs black, the last joint yellowish; head ob-ovoid, flattened in front, depressed at top, the vertices rounded; surface rough with many long, black hairs; color dead black.

On 12th the larva suspended, and at 8 p. m., 13th, pupated. From last moult to pupation 11½ days. (In case of other Melitaeas, two moults have occurred between hibernation and pupation.)

CHRYSALIS.—Length $\frac{5}{10}$ inch; breadth across mesonotum and abdomen $\frac{18}{100}$ in.; shape of *Phaeton;* cylindrical; head case narrow, compressed transversely, excavated at the sides; mesonotum not prominent, rounded, somewhat carinated, followed by a shallow excavation; the tuberculations which correspond to the larval spines and tubercles rounded, raised but little above the surface; color of anterior parts and wing cases dark pearl-gray, marked and spotted with black; of abdomen diluted black dotted with dull white, especially along mid-dorsum, and across same, on the posterior part of each segment, where the dots form parallel rows; the mid-dorsal tubercles orange, making a round spot on the fore part of each segment, and on each spot are two small black spots in cross row; in line with the spiracles, on the anterior side of each, is a slight orange discol-

oration ; along ventral side two rows of small orange spots corresponding to the small basal tubercles of the larva ; the wing case shows a large black patch on disk, also irregularly serrated marginal black spots, and submarginal spots, rounded and sub-lanceolate ; head case largely black ; on anterior part of mesonotum a large black sub-rectangular patch, below which is an arched stripe of black, and under this, at summit, two spots ; on the posterior part two curved demi-bands meeting at the carina.

From this chrysalis came a female butterfly 23rd May. Duration of this stage 10 days.

Another larva went to pupa and imago in Philadelphia, in Mrs. Peart's care. The other larvæ from the first eat little, and some became lethargic, and some of them died. But one seemed healthy and asleep, and 23rd May I returned it to the ice box. From time to time I looked at it ; on 6th July brought it to my room and laid it on Chelone leaf. But as by 8th it had eaten nothing, though it had moved a little in the glass, I replaced it on the ice. As I write, 20th Aug., it is sweetly sleeping. It seems odd that a larva in this climate should go over the second season, as this bids fair to do.

Rubicunda belongs to the *Anicia* sub-group, flies from North California at least to Vancouver Island. I have had mature larvæ of *Anicia* and of *Baroni* (another of this sub-group), and the three species are distinctly different in this stage. They all have similar habits as far as I know them, and probably all will eat the plant of *Phaeton*, Chelone glabra, as *Chalcedon* also does.

INSECTS IN ARCTIC REGIONS.

[Extracted from "Das Insektenleben in Arktischen Landern, von Christopher Aurivillius," forming part of Nordenskiold's "Studien und Forschungen veranlasst durch meine Reisen im hohen Norden :" Leipzig, 1885.]

(From the Entomologist's Monthly Magazine.)

A special interest attaches to the question of the mode of life in insects in relation to their surroundings in high Northern latitudes. Knowing, as we do, that the time available for the development of an insect in the extreme North is limited to from 4 to 6 weeks in the year, one has felt

surprised how it could be possible for certain species to run through all their transformations in so short a time.

R. McLachlan, in his paper on the insects of Grinnell Land (Journ. Linn. Soc., Zoology, vol. xiv.), refers to the difficulties which the shortness of the summer interposes to the development of insects, and intimates his suspicion that a development which would with us take place in a single summer would there require several summers.

The correctness of this suspicion has been completely established by the interesting observations on species of *Lepidoptera* in South Waranger, in latitude 69° 40′, made by G. Sandberg. He was successful in watching the development of some extreme Northern species from the egg.

Let us take as an example *Œneis Bore*, Schn., a true hyperborean butterfly, which has never been found outside the Arctic circle*, and even there only occurs in places which bear a truly Arctic stamp.

The imago flies from the middle of June onwards, and lays its eggs on various species of grass. The eggs are hatched the same summer; the larva hibernates below the surface of the earth, feeds and grows all through the following summer, but does not succeed in attaining its full size; it then hibernates a second time, and does not assume the pupa state till the spring of the following year.

The pupa, which in the allied forms in more southern localities is freely suspended in the air to a grass-stem or some similar object, here reposes in the earth, which in so inclement a climate must evidently be a great advantage.

The butterfly escapes from the pupa-skin after an interval of from 5—6 weeks, a period of unusual length for a diurnal Lepidopteron. In more southern lands the pupal repose of butterflies in summer rarely exceeds a fortnight. Hence, the entire metamorphosis is more tedious than in more temperate regions.

By these and other observations, Sandberg shows that one Arctic summer, in latitude 70°, does not suffice for the development of many *Lepidoptera*, but that two or more summers are required for the purpose.

If, therefore, more than one summer is needful for the development of *Lepidoptera*, it appears to me even more certain that Humble-bees must

* Mr. W. H. Edwards informs us that Mr. David Bruce has taken *Chionobas Taygete* Hub., which is syn. of *Oeneis Bore* Sch., in Colorado, on summits, at high elevation. Mr. Edwards' Catalogue, No. 304, says *Taygete* Hub. = *Bootes* Bd., and Staudinger's Cat. says *Bore* Sch. is the same as these, that is, it is all one species.—Ed. C. E.

require more than one summer. With us it is only the fully developed females which survive from one year to the next; in spring they form the new nest, lay eggs, and bring up the larvæ which develop into workers, and thus begin to contribute to the support of the family, whence at last towards autumn males and females are developed. It seems hardly credible that all this can happen each summer in a similar way at Grinnell Land, in latitude 82°, especially as there the supply of food must be less than with us. Hence, the development of a colony of Humble-bees must there be something quite different.

Were it not satisfactorily established that Humble-bees do occur in such high latitudes, one might, from our knowledge of their mode of life, be disposed to maintain that under such conditions they could not live.

They seem, however, to have one advantage over their more Southern brethren. In the Arctic regions they do not seem to be troubled with parasites, such as *Conops*, *Mutilla*, which help to diminish their numbers in other countries.

BOOK NOTICES.

Revised Catalogue of the Diurnal Lepidoptera of America North of Mexico, by Wm. H. Edwards, 8vo., pp. 95. From Transactions of the American Entomological Society, 1885.

This revised catalogue of American butterflies was greatly needed. Since Mr. Edwards published his first catalogue in 1877, much new material has accumulated, more than a hundred new species have been described, while a vast amount of information has been published on the preparatory stages and habits of these insects. Much of this has been communicated by the author of the catalogue himself, who has brought an amount of enthusiasm to bear on this interesting field of research exceeding that of any of his predecessors or co-laborers, while his full and accurate descriptions have been everywhere appreciated. Other excellent workers have also added to our stock of knowledge in this department, to all of which ready reference is had by the use of this catalogue. The new edition gives fuller references with dates, whereas the former catalogue gave no date. Many corrections are made in the synonymy, the result of a careful scrutiny by the author of every species in the entire list; the localities also are given with greater fullness. A large propor-

tion of the additions to the list of new species are to be found in the Hesperidæ, to which 56 have been added. Many additions have also been made to Melitaea, Thecla and Argynnis. A new and excellent feature is a copious index of genera and species, which will be much appreciated by all who have occasion to consult its pages. In this catalogue the author has given us the full benefit of his long experience and careful study, and has produced a work which will not only commend itself, but will be indispensable to all who are engaged in the study of American butterflies.

CORRESPONDENCE.

Dear Sir: In the last No. of the ENTOMOLOGIST appears a description of *E. Provancheri* by M. L'Abbe Provancher, in which the species is credited to British Columbia. This is a mistake, as the specimens contributed to him, and from which the description was made, were bred from cocoons of *A. Luna*, collected in Muskoka, a little south of Bracebridge, by Mr. R. Mosey, who handed them to me.

W. BRODIE, Toronto.

Dear Sir: On page 107 of the present volume of the CAN. ENT., Mr. Frederick Clarkson gives an account of his "Seaside Captures," and at the close of the paper says: "Among the treasures of the beach I collected several shells perforated in every part by the young of one of the lower order of Crustaceans, and rendered immaculate by the washing of the tide and the sun's rays." A little further on he continues: "The mouth parts of these Sea Worms, or Barnacles, are strong and corneous, and are capable of excavating galleries in the hardest substances."

Mr. Clarkson is in error in ascribing this tunneling of the shells to a Crustacean, for it is the work of a species of sponge (Cliona). If some of the recently cast up shells are broken open, the sponge will be readily seen, and its structure may be examined. It burrows in marble, as he describes, and particularly in the oyster, though also in other shells, such as Natica and Pyrula.

WM. T. DAVIS, Tompkinsville, Staten Island.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., SEPTEMBER, 1885. No. 9

LARVA OF PARASA CHLORIS, H.-Sch.

BY G. H. FRENCH, CARBONDALE, ILL.

Length .50 of an inch, elliptical, as is the usual shape of the Lymacodes group, nearly .20 of an inch high and about the same width. The dorsum has four lines of purplish black alternating with white, and bordered outside with yellowish white or pale yellow. The region of the subdorsal line is a bright vermillion ridge with yellowish white tubercles arising from joints 2, 3, 4, 7, 10 and 12, those on joint 2 moderately short, but those on joints 4 to 12 are nearly one fourth of an inch long; all of them spiny. There are short bunches of spines on the intervening joints, as it were representatives of missing tubercles. In the subdorsal space are four scarlet lines alternating with lines of yellowish white, the middle yellowish line instead of being continuous, consists of alternate blotches of vermilion and yellowish white. The substigmatal line is vermilion, bordered as the subdorsal with pale yellow, and this also has its row of yellowish white spiny tubercles, each about one sixteenth of an inch long. Below this is a single dark purple line bordered each side with a lighter shade, and below this a vermilion line or rather a series of tubercles without spines in place of the prolegs. Legs 6, no prolegs, but the under side of the body consisting of a muscular pad upon which the insect glides along instead of walking. Head brown, retractile when at rest into the joint back of it.

The food plants of this peculiar larva seem to be apple and rose. In 1880 one was brought to me on an apple leaf. This one soon died; but last season, September 18, 1884, another was found on a rose leaf that soon spun its cocoon, but it did not change to a chrysalis till the following spring. As soon as found the larva was placed in a jelly glass, and it spun on the under side of the cover with the cocoon touching the side. When the cover was taken off this broke the cocoon, leaving a small piece attached to the glass. Through this small opening the larva could be seen every time the cover was removed to moisten the contents of the

dish, till after the warm spring weather had roused the most of insect life into activity. The imago appeared July 14, 1885. The cocoon was .50 of an inch long, dark brown, smooth, egg-shaped like the others of the group, and smooth on the inside. The empty pupa skin is thin, pale brown.

A PRELIMINARY LIST OF THE ARTHROGASTRA OF NORTH AMERICA (EXCLUDING MEXICO.)

BY LUCIEN M. UNDERWOOD, PH. D., SYRACUSE, N. Y.

The Arthrogastra of North America have scarcely been studied except in two or three families, the principal part of the American literature consisting of scattered notes and descriptions. Two or three more pretentious papers have been published by Wood, Putnam and Hagen. A broad field for study is open for future investigators. In order to call attention to the group and secure such co-operation of collectors as may be possible, the following preliminary list of twenty genera and fifty-nine species has been prepared. A few forms are added from Lower California and Cuba which will probably be found within the limits of the United States. Additions and corrections to the list are solicited, as well as specimens from all parts of the country, for which a suitable return will be made.

FAMILY PHRYNIDÆ.

1. PHRYNUS, Oliv.

1. P. ASPERATIPES, Wood. Proc. Phila. Acad. 1863, 111 : Jour. Phila. Acad. 2nd series, v., 375 (1874).

Hab. Lower California.

FAMILY THELYPHONIDÆ.

1. THELYPHONUS, Latr.

1. T. GIGANTEUS, Lucas. Magazin de Zoologie (Guerin) 1835. *Wood*, Jour. Phila. Acad., 2nd series, v., 374 (1874).

T. excubitor, Girard, in Marcy's Rep. Exploration Red River, 265, Pl. xvii., fig. 1-4 (1854).

Hab. Southwest United States.

FAMILY SOLPUGIDÆ.

I. DATAMES, Simon.

1. D. FORMIDABILIS, Simon. Annales de la Soc. Entom. de France, ix., 136 (1879).

D. striatus, Putnam. Proc. Davenport Acad., iii. 255, 266, Pl. i., fig. 1, Pl. ii., fig. 7 (1883).

Hab. California, Arizona.

2. D. PALLIPES, Simon. Ann. de la Soc. Entom. de France, ix., 139 (1879). *Putnam*, Proc. Davenport Acad., ii., 184 (1880); Ibid., iii., 267, Pl. i., fig. 6 (1883).

Galeodes pallipes et subulata, Say., in Long's Exped. to Rocky Mts. (1823).

Hab. Kansas, Colorado, Utah, Wyoming, Nevada.

3. D. SULFUREUS, Simon. Ann. de la Soc. Entom. de France, ix., 142 (1879). *Putnam*, Proc. Davenport Acad., iii., 267 (1883).

Hab. Georgia, Texas, Colorado.

4. D. CALIFORNICUS, Simon. Ann. de la Soc. Entom. de France, ix., 143 (1879). *Putnam*, Proc. Davenport Acad., iii., 266, 267, Pl. iv., fig. 32-40 (1883).

Hab. California, Arizona.

5. D. GIRARDII, Putnam. Proc. Davenport Acad., iii., 257, 267, Pl. ii., fig. 12 (1883).

Galeodes subulata, Girard, in Marcy's Rep. Expl. Red River, 241 (1854). (Not *G. subulata*, Say.)

Hab. Texas, New Mexico, Arizona.

6. D. GENICULATUS, Simon. Ann. de la Soc. Entom. de France, ix., 136 (1879). *Putnam*, Proc. Davenport Acad. iii., 268 (1883).

Gluvia geniculata, Koch. Archiv für Naturgesch , viii., 355 (1842).

Hab. Texas.

II. GLUVIA, C. Koch.

1. G. ELONGATA, Koch. Archiv für Naturgeschich., viii., 350-356 (1842). *Putnam*, Proc. Davenport Acad., iii., 268 (1883).

Hab. Texas.

III. CLEOBIS, Simon.

1. C. CUBÆ, Simon. Annales de la Soc. Entom. de France, ix., 149 (1879). *Putnam*, Proc. Davenport Acad., iii. 268, Pl. i., fig. 5 (1883).

Galeodes Cubæ, Lucas, in Histoire physique, politique et naturelle de l'Isle de Cuba, par M. Ramon de la Sagra, Pl. v., fig. 6 (1857).

Cleobis Stimpsoni, Putnam. Proc. Davenport Acad., iii., 261 (1883).

Hab. Florida, Cuba.

FAMILY SCORPIONIDÆ.

1. BUTHUS, Leach.

1. B. BIACULEATUS, Latr., in Coll. de Museum. *Wood* Jour. Phila. Acad., 2nd series, v., 368 (1874).

Hab. Florida.

2. B. BOREUS, Wood, Jour. Phila. Acad., 2nd series, v., 368 (1874).

Scorpio boreus, Girard, in Marcy's Rep. Exploration Red River, 238, Pl. xvii., fig. 5-7 (1854).

Hab. Utah.

3. B. CALIFORNICUS, Wood, Jour. Phila. Acad., 2nd series, v., 364 (1874).

Scorpio Californicus, Girard, in Marcy's Rep. Exploration Red River, 240 (1854).

Hab. California.

4. B. CAROLINIANUS, Wood, Jour. Phila. Acad., 2nd series, v., 363 (1874).

Scorpio Carolinianus, Beauv., Insect. Rec. en Afrique et en Amerique, 190, Pl. v., fig. 3 (1805).

Buthus vittatus, Say., Jour. Phila. Acad., ii., 61 (1821) : Coll. Writings, ii., 11.

? *Scorpio Sayi.* Girard, in Marcy's Exploration Red River, 240 (1854).

? *Væjovis Carolinus*, Koch, Die Arachniden, x., 7, fig. 759.

Hab. So. States, Texas, Kansas.

5. B. EMARGINATICEPS, Wood. Proc. Phila. Acad., 1863, 109 ; Jour. Phila. Acad., 2nd series, v., 367, Pl. 40, fig. 1, 1a, 1b, 1c (1874).

Hab. Lower California.

6. B. EUSTHENEURA [U. S.] Wood. Proc. Phila. Acad., 1863, 109; Jour. Phila. Acad., 2nd series, v., 368 (1874).

Hab. Lower California.

7. B. EXILICAUDA [U. S.] Wood. Proc. Phila. Acad., 1863, 107; Jour. Phila. Acad., 2nd series, v., 366 (1874).

Hab. Lower California.

8. B. HIRSUTUS, Wood. Proc. Phila. Acad., 1863, 108; Jour. Phila. Acad., 2nd series, v., 367, Pl. 40, fig. 1, 1a, 1b, 1c (1874).

Hab. Lower California.

9. B. LESUEURII, Gervais, Archiv du Museum, iii., 226, Pl. xi., fig. 27-29, (1844); Apteres, iii., 61, (1844); *Wood*, Jour. Phila. Acad., 2nd series, v., 365, (1874).

Hab. Cuba.

10. B. PUNCTIPALPI, Wood. Proc. Phila. Acad., 1863, 109; Jour. Phila. Acad., 2nd series, v., 369 (1874).

Hab. Lower California.

11. B. SPINIGERUS, Wood. Proc. Phila. Acad., 1863, 110; Jour. Phila. Acad., 2nd series, v. 370, Pl. 40, fig. 2, 2a, 2b (1874).

Hab. Texas.

II. CENTRURUS, Gervais.

1. C. PHAIODACTYLUS, Wood. Proc. Phila. Acad., 1863, 111; Jour. Phila. Acad., 2nd series, v., 372, Pl. 40, fig. 3, 3a, 3b (1874).

Hab. Utah.

III. SCORPIO, DeGeer.*

1. S. ALLENII, Wood. Proc. Phila. Acad. 1863, 107; Jour. Phila. Acad., 2nd series, v., 372 (1874).

Hab. Lower California.

IV. UROCTONUS, Thorell.

1. U. MORDAX, Thorell. Ann. and Mag. Nat. Hist., xvii., 11.

Hab. California.

* I have omitted from the list DeGeer's species, *S. punctatus*, *S. maculatus*, *S. testaceus*, *S. australis*, as unrecognizable.—Cf. Memoirs Insectes, vii., 343-348.

FAMILY CHERNETIDÆ.

I. CHELIFER, Geoff.

1. C. CANCROIDES, Latr. Hist. Nat. Crust., etc., vii., 141, Pl. 6, fig. 2 (1804). *Hagen*, Record Amer. Entom., 1868, 51; Amer. Nat., ii., 216 (1869); Proc. Boston Soc., N. H., xiii., 264 (1870).

Hab. U. S., generally to California (Simon).

2. C. MURICATUS, Say. Jour. Phila. Acad., ii., 63 (1821); Coll. Writings, ii., 11; *Hagen* Record Amer. Entom., 1868, 51; Proc. Boston Soc., N. H., xiii., 266 (1870).

Hab. "North America" (Say).

3. C. SCABRICULUS, Simon. Ann. de la Soc. Entom. de France, series v., viii., 154 (1878).

Hab. California.

4. C. ACUMINATUS Simon. Ann. de la Soc. Entom. de France, series v., viii., 156 (1878).

Hab. California.

5. C. ALIUS, Leidy. Proc. Phila. Acad., 1877, 261.

Hab. Pennsylvania.

6. C. WRIGHTII, Hagen. Record Amer. Entom., 1868, 52; Proc. Boston Soc., N. H., xiii., 267 (1870).

Hab. Cuba.

II. CHERNES, Menge.*

1. C. OBLONGUS, Hagen. Record of Amer. Entom., 1868, 51; Proc. Boston Soc., N. H., xiii., 268 (1870).

Chelifer oblongus, Say. Jour. Phila. Acad., ii. (1821); Coll. Writings, ii., 12.

Hab. "North America" (Say).

2. C. SANBORNI, Hagen. Record of Amer. Entom., 1868, 51; Proc. Boston Soc., N. H., xiii., 268 (1870).

Hab. Massachusetts.

* Simon reunites the genera *Chelifer* and *Chernes*, which were separated by Menge, who was followed by L. Koch. He claims that the characters hitherto regarded as generic, are merely gradal, and that while certain widely separated species have these characters clearly marked, in others they gradually approach each other. In deference to American writers I leave them for the present. Cf. Les Arachnides de France, vii., 19 (1879).

III. CHTHONIUS, C. Koch.

1. C. CÆCUS, Packard. Amer. Nat., xviii., 203 (1884).

Hab. Virginia.

2. C. PACKARDII, Hagen.

3. C. PENNSYLVANICUS, Hagen. Record of Amer. Entom., 1868, 52; Proc. Boston Soc., N. H., xiii., 268 (1870).

Hab. Pennsylvania.

IV. OBISIUM, Leach.*

1. O. BRUNNEUM, Hagen. Record of Amer. Entom., 1868, 52; Proc. Boston Soc., N. H., xiii., 269 (1870).

Hab. "North America."

2. O. CAVICOLA, Packard. Amer. Nat., xviii., 202 (1884).

Hab. Virginia.

3. O. THEVENETI, Simon. Ann. de la Soc. Entom. de France, series v., viii., 156 (1878).

Hab. California.

4. O. MACILENTUM Simon. Ann. de la Soc. Entom. de France, series v., viii., 157 (1878).

Hab. California.

FAMILY GONYLEPTIDÆ.

I. PHRIXIS.

1. P. LONGIPES, Cope. Third and Fourth Geol. Rep. Indiana, 180 (1872).

Hab. Indiana.

FAMILY PHALANGIDÆ.

I. PHALANGODES, Tellkampf.

1. P. ARMATA, Tellkampf. Archiv für Naturge schichte, 1844, 320, Pl. viii., fig. 7-12.

Acanthocheir armata, Lucas. Annales de la Societè Entom. de France, viii., 977 (1860). *Wood*, Comm. Essex Inst., vi., 36 [Sep. 27] (1868).

Hab. Mammoth Cave, Kentucky.

* This genus has usually been credited to Illiger, but as Simon shows (Les Arachnides de France, vii., 51) it properly belongs to Leach.

2. P. FLAVESCENS, Simon. Les Arachnides de France, vii., 156, note (1879).

Erebomaster flavesceus, Cope. Amer. Nat., vi., 420 (1872); Third and Fourth Geol. Rep. Indiana, 180 (1872).

Scotolemon flavesceus, Packard. Bull. U. S. Geol. Survey (Hayden) iii., 165 (1877).

Hab. Wyandotte Cave, Indiana.

3. P. ROBUSTA, Simon. Les Arachnides de France, vii., 156, note (1879.)

Scotolemon robustum, Packard. Bull. U. S. Geol. Survey (Hayden) iii., 164 (1877).

Hab. Utah.

II. PHALANGIUM, L.

1. P. BICOLOR, Wood, Comm. Essex Inst. vi., 28 [19]. (1868).

Hab. Pennsylvania.

2. P. CALCAR, Wood. Comm. Essex Inst. vi., 26 [17]. (1868).

Hab. Virginia.

3. P. CINEREUM, Wood. Comm. Essex Inst. vi., 25 [16]. (1868).

Hab. New York.

4. P. DORSATUM, Say. Jour. Phila. Acad. ii., 66 (1821); Coll. Writings ii., 13; *Wood*, Comm. Essex Inst. vi., 18 [9]. (1868).

Hab. New York, Pennsylvania, Dist. of Columbia.

5. P. EXILIPES, Wood. Comm. Essex Inst. vi., 23 [14]. (1868).

Hab. Nevada, California.

6. P. FAVOSUM Wood. Comm. Essex Inst. vi., 28 [19]. (1868).

Hab. Nebraska.

7. P. FORMOSUM Wood. Comm. Essex Inst. vi., 30 [21]. (1868).

Hab. Pennsylvania, Dist. of Columbia.

8. P. GRANDE Say. Jour. Phila. Acad. ii., 67 (1821); Coll. Writings ii., 14; *Wood*. Comm. Essex Inst. vi., 34 [25]. (1868).

Hab. So. States.

9. P. MACULOSUM, Wood. Comm. Essex Inst. vi., 31 [22]. (1868).

Hab. Pennsylvania, Virginia.

10. P. NIGROPALPI, Wood. Comm. Essex Inst. vi., 22 [13]. (1868).

Hab. Pennsylvania.

11. P. NIGRUM, Say. Jour. Phila. Acad. ii., 66 (1821); Coll. Writings, ii., 14; *Wood*, Comm. Essex Inst. vi., 34 [25]. (1868).

Hab. North Carolina, South Carolina, Georgia, Texas, Nebraska.

12. P. PICTUM, Wood. Comm. Essex Inst. vi., 30 [21]. 1868.

Hab. Massachusetts.

13. P. VENTRICOSUM, Wood. Comm. Essex Inst. vi., 32 [23]. (1868).

Hab. Pennsylvania, Nebraska.

14. P. VERRUCOSUM Wood. Comm. Essex Inst. vi., 29 [20]. (1868).

Hab. United States.

15. P. VITTATUM, Say. Jour. Phila. Acad. ii., 65 (1821); Coll. Writings ii., 13; *Wood*, Comm. Essex Inst. vi., 20 [11]. (1868).

Hab. So. States, Texas, Nebraska.

III. CYNORTA.

1 C. ORNATA, Simon (?)

Gonyleptes ornatum, Say. Jour. Phila. Acad. ii., 68 (1821); Coll. Writings ii., 15; *Wood*, Comm. Essex Inst. vi., 37 [28]. (1868).

Hab. Georgia, Florida.

IV. NEMASTOMA, C. Koch.

1. N. TROGLODYTES, Packard. Bull. U. S. Geol. Survey (Hayden) iii., 160 (1877).

Hab. Utah.

2. N. INOPS, Packard. Amer. Nat. xviii., 203 (1884).

Hab. Kentucky.

V. OLIGOLOPHUS, C. Koch.*

1. O. BICEPS.

Mitopus biceps, Thorell. Bull. U. S. Geol. Survey (Hayden) iii., 525 (1877).

Hab. Colorado, Idaho.

VI. PHLEGMACERA, Packard.

1. P. CAVICOLEUS, Packard. Amer. Nat. xviii., 203 (1884).

Hab. Kentucky.

VII. TARACUS, Simon.

1. T. PACKARDI, Simon. Comptes rendus Societe Entom. de Belgique, 2nd series, No. 64 (1879).

Hab. Colorado.

* *Mitopus* Thorell is joined to *Oligolophus* C. Koch by Simon, Les Arachnides de France, vii., 239 (1879).

ON THE DISTRIBUTION OF THE GENERA OF CARABIDÆ ALONG A RIVER SYSTEM.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The St. Joseph River runs nearly diagonally through the township of Constantine, from N. E. to S. W. A small affluent, called Fawn River, empties into it at the point where the town itself is located.

The characteristic vegetation along the banks of the main river above town is beech, maple, elm, iron-wood, walnut, butternut, papaw, magnolia (or a tree very nearly allied), spice-bush, prickly-ash, sumach, witch-hazel, wild grape, ash, oak and hickory, with many quite rare and beautiful wild flowers, such as are found in rich and favorable places. But that of the affluent region is almost entirely oak and hickory (mostly oak), with hazel, sumach, a few poplars, willows, and in some places cedars, but with few wild flowers of any account. The cedars are also found upon the main river, both above and below town. This difference in vegetation is probably due to a difference in the nature of the soil, the lower and richer soil of parts of the main river producing a richer and more varied flora than the higher and poorer parts adjoining the affluent.

Now I have noticed in collecting that the *Carabidæ* seem to be distributed in a somewhat systematic manner along the main river and its affluent, genera occurring on the former which are not found along the latter, and less frequently *vice versa*. On the main river I have taken *Omophron*, *Helluomorpha*, *Galerita*, *Brachylobus* (*Lithophilus* [Say]), *Dicaelus*, *Hestonotus* and *Amphasia*, which I have not taken on the affluent. *Galerita*, however, I have taken on the prairie to the south, but this partakes more of the nature of the main river region.

While on the affluent I have taken *Notiophilus*, *Calosoma* and *Pasimachus*, which I have not taken on the main river. The *Notiophilus* is a specimen which I have determined to be *sibiricus* Mots. It was taken on 19th October, 1884, while I was chopping over some sod with a hatchet on an elevated grassy bank, which formed an open spot in the woods at this place. As this is the only specimen of the genus I have up to this time met with here, it may be found yet upon the main river. Of *Calosoma*, I have often taken *calidum* (Fab.), and once *scrutator* (Fab.), up the affluent. The latter, a very rare insect here, three or four specimens only having been taken to my knowledge within the last

eleven years, I should have expected to find on the main river, as the rarer and more beautiful genera seem to be found there more frequently. However, one or two of the specimens were taken in town, and may belong to either region; and I think very likely that *calidum* (Fab.) is found up the river in the fields.

The genera I have observed upon both the main river and the affluent are *Scarites*, *Brachynus*, *Platynus*, *Pterostichus*, *Chlaenius* and *Harpalus*. I think I have also taken *Galerita* on the affluent, but such occurrence is rare. *Brachynus* and *Chlaenius* are much more abundant on the main stream, as indeed are nearly all of those given. I know of only two specimens of *Brachynus* being taken on the affluent, while in damp or wet places on the main river, which are much better suited to them, they are quite plentiful. Of the genera *Carabus* and *Cychrus*, I have never met with a representative here in any section.

This distribution is undoubtedly due to the richer flora of the main river producing more varied species upon which the *Carabidæ* prey, and also to that to which in turn the richer flora is due, namely, the richer soil and more favorable locality.

MONOGRAPH OF THE EMBIDINA.

(Continued from page 155.)

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

6. *Oligotoma Westwoodi*, n. sp.

O. Westwoodi Hag., Synops. Embid., p. 222 (no description, not named.)

Length of body 4½ mill.; exp. of wings 7 mill.

Male: As the specimen is enclosed in copal *(Gummi anime)*, the colours are not certain, but the head, with antennæ and palpi, the thorax and the legs in part, seem to have been blackish-fuscous; head more Raphidia-like than in any other species; more than half longer than broad; the rounded sides sloping down, the occiput less than half as broad as the front part with the eyes; head above slightly convex, epistom large, convex; eyes large, prominent, about orbicular, with a small ex-

cision for the insertion of the antennæ; facets large, globose; antennæ long, reaching the end of the metathorax, inserted in a longer socket, 15-jointed; 1st joint a little thicker, cylindrical, half as broad as long; 2nd as long as broad; all others obclavate, to three times longer than broad, but the 3rd to 5th a little shorter than the rest, the last one more ovoid, with tip rounded; there seems not to be wanting any joint more. Labrum large, rounded, a little darker in middle; max. palpi 5-jointed, the three basals alike, short, as broad as long; 4th a little longer, 5th longer, ovoid; labial palpi 3-jointed, apical joint longer, ovoid. Prothorax as broad as occiput, about quadrangular, broader near the mesothorax; a deep transversal sulcus a little before middle, where the sides are notched; legs as usual, femoral and basal joint of fore legs elongate-inflated; middle legs less strong.

Wings very little longer than the abdomen, narrow, ¾ mill. broad, four times longer than broad, rounded on tip, hairy around and on the membrane, which is rugose, smoky, with four white longitudinal bands, the fifth near the costa being almost obsolete. Subcosta dark, ending unconnected after the basal fourth of the wing; a little earlier in the hind wings. Radius a little before the tip of the wing connected below with one long vein, which runs parallel to the radius and ends on the tip. This vein represents the sector and its upper branch (McLachl.); the sector itself is wanting from the place where the upper branch originates (it is marked by a small break of the vein) to the tip. There is no other vein in the wing except the strong anal vein originating from the base of the sector shortly before a transversal between the sector and radius. I have for convenience always used McLachlan's names of the veins, though it is obvious by this species that what he calls upper branch is really the prolongation of the sector itself. I will try later to give a homology of all the veins of the wing. The hind wings have exactly the same very simple venation; the discoidal cell is open. The abdomen is not entirely visible from above, as a Hymenopterous insect, partly overlaying. The segments are equal, once broader than long, except the two last ones, which are considerably shorter; the apical margin of the last one is cut asymmetrically, the right half of it considerably shorter than the left side; appendages as long as the four last segments, stout, two-jointed; the apical joints cylindrical, rounded at tip, as long as the basal ones; the appendages are asymmetrical, the right one stout, straight, a little longer, the left one curvated, a little thinner. No side-view is possible. Between

the appendages is projected a broad inflation, narrower on tip, and just on its middle a spine coming from the right, as long as the basal joint, cylindrical, sharp on tip, somewhat curvated to the right; a much smaller and shorter spine on the left side does not exceed the inflation. Abdomen from below with penultimate segment as long as the others, very dark, blackish; last segment pyramidal, rounded on tip, the left side asymmetrical, stronger notched.

In the same lot of copal I received another specimen of exactly the same size, but differing as follows: The whole insect has copal colours, less dark, only the head is dark brown. Both antennæ are only 14-jointed; the apical joint is ovoid, without any traces on tip of a broken-off segment. Wings pale, but with obvious traces of a smoky color and white longitudinal bands; the discoidal cell is closed in all four wings by one strong transversal vein, and two in the left anterior wing; all wings show 4 to 5 small costal transversals in the apical half, but these may also exist in the other specimen, the costal margin of which is not plainly visible.

The venation is alike, but all veins not developed are indicated by a series of small, darker hairs inserted in a more visible and deeper hole. I have formerly pointed out that just the same occurs in the wing cases of the Calopteryx nymphs. The appendages are to be seen well from below; they are alike; the right spine is longer, less thick, bifid on tip; near by is a short, cylindrical, curvated tube, with open end; the left spine is triangular at base, the apex twisted and sharply pointed.

One joint more or less of the antennæ, one transversal more or less in the wing, can of course not be a specific difference. The marked character of the right spine between the appendages would be of importance, if it would be possible to examine the same organ in the other specimen. This is not the case, and therefore the existence of a similar character is at least not impossible.

Hab.—I received both specimens forty years ago among other copal insects bought from the large Drogues House Gehe in Dresden, Germany. It was sold as East Indian copal. Later I discovered that all copal sold at that time as East Indian copal came from Salem, Mass. It is indeed probably Zanzibar copal; this trade was then entirely in the hands of Salem merchants; the copal was brought to Salem by the extensive East Indian trade of this city, and sold to Europe.

I request the honor of dedicating this gentle species, the smallest

known, to the first monographer of Embia, the Veteran Entomologist—Indefatigatus, Doctissimus !

The rudimentary venation separates this species from all known, by the want of the lower branch of the sector.

Prof. Westwood in his monograph, l. c., p. 374, mentions two apparently distinct species in gum copal, probably from the eastern coast of Africa, in the collection of Dr. Strong, of Brook Green—"one which from its size may probably be the *Embia Savignyi;* seemed to possess 14-jointed antennæ." The size of *E. Savignyi* is so much larger that this copal species can not be *O. Westwoodi.*

The other species was of still larger size, with slightly stained wings and 24 joints in the antennæ. Both are unknown to me.

The published copal insects contain no Embia. A careful examination of the large collection of copal insects here did not give any more Embia.

7. *Oligotoma nigra*, n. sp.

Embia nigra Hagen, Synop. Psoc. et Embid., l. c., p. 221–222 (no description).

Male, dry: Length of body 8 mill.; exp. of wings 13–15 mill. Head dark fuscous, a little shining, sparingly covered with small pale hairs; head a little longer than broad; the part behind the eyes narrower, rounded, nearly orbicular; above slightly convex; eyes large, black; epistom quadrangular; labrum large, fuscous in middle, rounded; antennæ longer than head and prothorax, 13 joints present, fuscous, very hairy, hairs long, brown; 1st joint cylindrical, a little thicker than the others, once longer than broad; 2nd cylindrical, short, as long as broad; 3rd as long as 1st, larger on tip; 4th to 6th short, very little longer than broad, thicker on tip, 5th and 6th longer and thicker than 4th; 7th to 9th about alike, similar to the preceding ones, but longer; 10th to 13th longer, about four times longer than broad, more cylindrical; rest wanting. Another specimen has also 13 joints, but here the 10th to 13th are not so elongated; perhaps the difference is caused by the preparation. Mandibles strong, brown, with three black sharp teeth on tip; the right mandible has the inner teeth shorter; max. palpi 5-jointed, the two apical ones longer, the last one ovoid; lab. palpi 3-jointed, fuscous, the apical longer, ovoid; labium pale, rounded, bifid; head below brown, mentum blackish. Prothorax brown, much narrower and shorter than the head, a little longer than broad, and dilated to the wings; sides oblique; a transversal sulcus

after the apical third; the sulcus prolonged near the sides towards the base, inclosing an elevated part (les trois festons de Rambur).

Wings smoky fuscous, the median and the anal veins darker, blackish; five longitudinal white bands; four to five fine costals in the apical part; two (in one hind wing, four) transversals in the cell. Legs brown, articulations paler; dilated in the usual way, so far as it can be observed, the 1st joint of tarsi not very much dilated. Abdomen brown, last segment nearly cleft by a deep sulcus, nearer to the right; appendages long, very hairy; basal joint longer than the last segment, apical joint longer and thinner; right spine long, slowly thicker towards the base; tip sharp, bent up a little; this spine is turned strongly to the left, as long as the intromittant, cylindrical tube; the left spine is half as short, the sharp apical end returned. I can not ascertain if there is any asymmetry of the appendages.

The description is made from three males, showing the smaller dimensions, collected in Upper Egypt; the fourth, a little larger and much darker, collected near Cairo, is alike; the end of the abdomen is not visible.

Female ? dry. Length of body 10 mill.

The two females before me differ from the males by similar characters as *O. Michaeli.* The body is black, a little hairy, somewhat shining, except the head, which is finely aciculate above. Head more rounded, the eyes small, not prominent; antennæ (only 13 joints present) short; 1st joint thicker, cylindrical; 2nd very short, annular; 3rd longer, larger at tip; all the following alike, short, nearly globular; the 2nd to 4th joint a little paler than the others, which are blackish. Prothorax a little broader than in the male; mesothorax longer, narrower towards the prothorax, without any traces of wings; metathorax similar; legs black, articulations paler; the enlarged parts, principally the basal joint of the tarsus of fore legs, stronger developed and more enlarged. An external spine on the basal joint is perhaps present. Abdomen longer, black; last segment rounded on tip; the appendages thick, very short, the apical joint a little longer; the abdomen of these carded specimens can not well be examined, but I believe that I am seeing a female genital opening. I can not find any asymmetry.

Hab. The larger winged male and the two females, called larvæ by Prof. Schaum, were collected by him on the island of Rhoda, near Cairo, Egypt, end of January, 1851, by beating the grass with the net in the

evening. The winged one was very agile in flying. Of the wingless ones he never took more than two at one beat, and they moved around like a slow Staphylin. They were very rare in February. The smaller ones were collected by him in February, 1852, in Middle and Upper Egypt. They are said to be very common in summer.

The winged *O. nigra* is entirely different from *E. mauritanica* Lucas. In 1857 I had the opportunity of seeing the only copy of the splendid and very expensive Explor. de l'Algerie then existing in Germany, belonging to the R. Library in Berlin. Even then, the copy being at the binder's, I had only a hurried glimpse, together with the late Prof. Schaum, who believed his species to be identical with the species of Mr. Lucas. This explains the question mark after *E. nigra* in my Synopsis. Now I have this expensive work in my room! I remark this fact only to explain the difficulties with which entomologists had to contend thirty years ago. That the winged specimens are different from *E. Savignyi* is directly obvious. I can not decide if the wingless form belongs to the winged one. Prof. Schaum considered it to be the larva, but as it is of the same size with the winged, this is scarcely probable, except (being females) by assuming that the female imago is much larger. The symmetrical appendages are very different from those of the males, and it could be presumed that the wingless form belongs to *E. Savignyi;* but this species seems to be different. Therefore we have to wait for new observations. As I received first the black wingless form, I applied to it the name *E. nigra*, which I would not change as the name had been quoted by several authors.

A wingless specimen collected by the late Prof. Loew in Asia Minor, probably near Kellemisch, is similar, but less dark. The pinned specimen, 8 mill. long (last segment wanting), may belong to *O. nigra*. Head and prothorax similar, antennæ short, with 17 joints. The color of the abdomen below yellowish brown. The condition of the specimen is too indifferent to say more than to note the occurrence of a species similar to *O. nigra* in Asia Minor.

8. *Oligotoma antiqua.*

Embia antiqua Pictet and Hagen. Berendt Bernstein Ins. ii., p. 56, pl. 5, f. 7.

Male? wingless. Length of the body 10 millim.

Body dark, sparingly villous; head oblong, a little narrower behind and rounded; above light convex, smooth, depressed behind the eyes,

which are small, not prominent; antennæ as long as head and prothorax, 18-jointed; 1st cylindrical, thicker; 2nd very short; 3rd as long as 1st, the rest shorter, thicker on tip, the last one ovoid; max. palpi 5-jointed, the last one fusiform, longer; labial palpi 3-jointed, the last longest; labrum rounded; epistom short, broad; prothorax narrower and shorter than the head, quadrangular, sides straight, front angles sharp, hind angles rounded, a transversal sulcus in the frontal third; mesothorax quadrangular, longer than prothorax, near the front margin on each side an oblique impression, and behind a small horizontal one; metathorax similar, but shorter; no traces of wings. Abdomen with 9 oblong dorsal segments, the 8th shorter, apical margin notched; 9th large, conical, with a strong longitudinal impression, nearer to the right; below 8 segments, the last large, ovoid; appendages strong, very villous; apical joint thinner, cylindrical; the basal a little curvated; legs strong, villous, femora of fore and hind legs and basal joint of tarsi of fore legs largely inflated.

Hab. Four specimens in Prussian amber; I have little doubt that it belongs to Oligotoma; the apparent asymmetry of the last dorsal segment makes me believe that the appendages are also asymmetrical, as I had seen them so when studying the specimens; but these parts were not well visible. I have amended the description after manuscript notes, namely, the antennæ, which are there given with 19 joints, because the socket is counted as 1st joint. Since then more specimens have been found, but no winged ones.

9. *Embia Savignyi.*

Savigny Descript. d'Egypte Néuropt. pl. 2, f. 9-10 (no name).

Embia Audouin Expl. sommaire du planches, p. 194.

E. Savignyi Westwood, Trans. Linn. Soc., vol. xvii., p. 372, pl. ii., f. 1.

E. Savignyi Burm., Handb. vol. ii., p. 770, 1.

E. Savignyi Ramb., Neur. p. 311, 1.

E. Aegyptiaca Blanch., Hist. Ins. p. 48. (Not seen by me.)

E. Savignyi Brauer., Neur. Europas, 1876, p. 32.

Length of the body 9 mill.; with wings, 12 mil.; exp. of wings nearly 20. The measures are only approximative, the condition of the specimen not allowing more.

Male. Body leather-yellow, somewhat shining, villous; head about quadrangular, rounded behind, rather flattened above, a little depressed transversely behind the eyes; antennæ broken (Burmeister quotes 17 joints, Savigny figures only 15); eyes large, black, notched before; max.

palpi 5-jointed, brownish. Prothorax much narrower than the head, enlarged towards the wings; a little longer than broad, sides straight; in the anterior third a transversal sulcus; behind convex, divided by an impressed middle line. Mesothorax with a transversal elevation divided in the middle between the base of the wings. Legs a little darker with the usual dilatation of femur and the basal joint of tarsi of fore legs. Wings longer than the abdomen, a little broader than those of Oligotoma, light brownish-smoky, with five longitudinal white bands; the inferior branch of the sector is again furcated (and occasionally a third time, as in one wing of Savigny's figure and in the specimen before me). Four to five partly incomplete costal transversals, two in the closed cells, and several more in the two or three spaces between the sector-branches. Abdomen enlarged behind, last ventral segment larger, convex, shining, brown. Appendages broken; two-jointed, long, thick, after Savigny and Rambur. I presume the specimen to be a male, because no female genital opening is visible.

There exists no description of Savigny's type except Rambur's of the incomplete specimen in the Jardin de Plants in Paris, which has probably been figured by Savigny. Burmeister has described some specimens in the Museum in Berlin, Prussia, and my specimen is one of them.

Hab. Egypt, Savigny and Ehrenberg in Berlin Museum.

The figures by Savigny are excellent, as usual; it is to be remarked that he has seen and figured f. 9, u. e., the opening of the spinning glands inside of the labium.

Rambur, l. c., p. 312, carefully describes a larva which belongs very probably to this species. The patria of the larva, which is now in De Selys-Longchamps collection, is unknown. Perhaps it may be a female.

A wingless specimen collected by Prof. Schaum near Athens, Greece, November, 1851, now in my collection, agrees very well with Rambur's description; 10 mill. long, brownish-ferruginous, villous; the end of the abdomen of the carded specimen is not well visible. The head is a little more oval and not so distinctly quadrangular as in *E. Savignyi*. Antennæ short, 17 joints. The body is narrower than in *E. Savignyi*. Otherwise it has the characters described before as belonging to the female, namely, the small, non-prominent eyes, and the external spine of the basal joint of tarsi of fore legs. Of course it can not be decided if this specimen belongs to *E. Savignyi* or not. Prof. Schaum had also collected a winged specimen at the same place, which was unfortunately lost. Prof. Brauer, l. c., quotes this species from Southern Russia with ? (authority not stated).

NOTE ON HABIT OF LARVA OF P. ATALANTA.

BY W. H. EDWARDS, COALBURGH, W. VA.

In C. ENT., 14, p. 223, I stated that Newman, in Nat. Hist. Br. But., described the mature larva as pupating in a case specially prepared for the purpose on the plant it had been feeding on: "from the roof of this the caterpillar suspends itself and becomes a chrysalls." Also quoted from Harris, who says the larva "seeks a suitable place in which to undergo its transformations." In the conclusion of the paper, vol. 15, p. 19, I said that I had never found a case with pupa in it, though I had often taken cases with the larvae in earlier stages, and I ventured the conjecture that both Harris and Newman were right, but that in our climate the larva pupated differently from its habit in England.

On 24th July last, I received from Mr. Philip Laurent, of Philadelphia, about a dozen cases of *Atalanta*, each made of a single nettle leaf and containing a pupa suspended from the top. Mr. Laurent wrote that in 1882 this butterfly was very common, and that in a short time, on one occasion, he found 125 pupae in leaf cases; and that as far as observed, the larva selects a large leaf for its last case, in which it transforms; that as a rule it makes its last meal out of the outer end of the case, eating about an inch thereof; that he has however taken many that were not eaten at all; has also seen several in which pieces were eaten out of the side of the leaf.

I am glad to have this positive evidence; my opinion was based on the fact of never having found such a case, together with the testimony of Dr. Harris, as I understood it. But it is probable that I was wholly mistaken, and that the American habit of the species is like that in England. *Atalanta* was abundant here in 1881, but I have seen few individuals since. Just so *P. Cardui* was the most common butterfly here all through the season of 1884, and this year I have not seen one.

CORRESPONDENCE.

Dear Sir: While out for an ornithological ramble here on Cote des Neiges Mountain this afternoon, I observed a large number of *Danais archippus* congregated together; numbers were clustered on dead branches of trees and underbrush, also on ferns. I could easily have caught a

hundred without moving more than ten paces. I don't remember having seen this species so abundant here for several years. Last year *Pyrameis cardui* appeared to me to be the most plentiful butterfly here, during August and September. I also noticed a large number of this latter species on the marshes of Lake St. Peter, about sixty miles down from Montreal. This was in the early part of September, last year. If you consider the above notes interesting enough to publish, I should like to know the cause of the above mentioned assemblage of *archippus*. The weather was showery in the morning, and sunshiny in the afternoon, with a stiff breeze blowing from the south.

Montreal, 22nd Aug., 1885. ERNEST D. WINTLE.

CRYPTOBIUM FLAVICORNE, LEC.

Dear Sir: In his recent very interesting "A Study of the Species of *Cryptobium* of North America," Trans. Am. Ent. Soc., 1885, Dr. Horn has united with *pallipes* the forms hitherto known as *latebricola* and *flavicorne*. Having lately shown him a series of specimens in which the males have a denticle on the middle of the hind margin of the sixth (fifth visible) ventral segment, he writes that in none of the males of *pallipes* in his cabinet does this little tooth exist, and that he thinks it could not have existed in any specimens of the series which he examined while preparing his paper. He thinks, however, that the species thus indicated is the *flavicorne* Lec., and says the females are only distinguishable by the very pale rufo-testaceous antennæ of *flavicorne* and the more or less piceous antennæ of *pallipes*. Immature females of the latter in Dr. Horn's cabinet and in my own appear indistinguishable from *flavicorne*. FREDERICK BLANCHARD.

Dear Sir: Whilst being out on a drive through the country last summer, I noticed a small yellow butterfly near the road side, too small to be a *Colias philodice* Godt. I jumped off the wagon and captured it, after a brief chase. To my astonishment, it proved to be a fresh specimen of *Terias lisa* Boisd., the first one ever taken in this locality.

I think it will be well to remember the following: To prevent moulding of the sand used for relaxing specimens, put a few drops of carbolic acid in the water to moisten the sand with; it also prevents the moulding of specimens should they be closed up too long.

PH. FISCHER, Buffalo, N. Y.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., OCTOBER, 1885. No. 10

HISTORY OF THE PREPARATORY STAGES OF VANESSA MILBERTI, GODART.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Conical, the base flattened, the top rounded; ribbed vertically, the ribs being either 8 or 9 in number; these rise from the surface at about one third distance from base, increase in elevation gradually, and end at the summit about the little flattened space which contains the micropyle, with its rosette of minute reticulations; the ribs meet the summit at an angle of about 45°; in the last part of their course they are thin, and are grooved on both sides to the surface; between them are many fine horizontal striæ; color green. Duration of this stage probably 4 or 5 days.

YOUNG LARVA.—Length $\frac{8}{100}$ inch; color yellow-green; cylindrical, nearly even from 2 to 10, the segments well rounded; marked by rows of fine black tubercles, each of which gives out a black hair in length about equal to the diameter of body and nearly all straight; these tubercles are flat, like circular disks, and the hairs are barbed (as seen under a high power); 2 has a sub-oval chitinous black dorsal patch with two rows of tubercles, six in front row, and two behind, these last standing between the second and third from each end of front row; the hairs longer than elsewhere and bent over head; on 3 and 4 each is a straight cross row over dorsum of eight tubercles, four on either side mid-dorsal line, and the third tubercle from top has two hairs; after 3 and to 13 are six tubercles each, disposed differently, four being on the front part of the segment, but not in straight line, the lower one of either side being a little behind the upper one, and the third tubercle lying between the two others, on the last part of the segment; these form three longitudinal rows from 3 to 13; on extreme end of 13 is an oval chitinous patch with several tubercles, the hairs straight and horizontal; below the spiracles from 4 to 12 are two short hairs each, from minute tubercles, the posterior one

raised a little above the other; on 13 but one; on 2 are three lateral tubercles, each of which gives two hairs, and placed, one above, one in front of, and one below, the spiracle; on 3 and 4, in line with the lower tubercle of 2 and the lower of the pair on the segments after 4, is a single tubercle and hair; over the prolegs are two short hairs each, and in same line, on 5, 6, 11, 12, is one hair; head rounded, a little depressed at suture, color black, shining; surface much covered with fine tubercles and bent black hairs. (The tubercles and hairs of this species are similar, and similarly placed, to those of *V. Antiopa).* Duration of this stage about two days.

After First Moult.—Length at 12 hours, $\frac{14}{100}$ inch; the middle of dorsum green cut by a brown line; the junctions of segments also green; the rest of upper half black-brown, below this and the under side yellow-green (some examples are darker than others, more brown, less green); above the spiracles is a yellowish wavy line from 5 to 10 inclusive, and with the spiracles a brown line; there are several rows of spines, one dorsal and three on either side; these are disposed as described in last stage, are low, rounded, with a small cone on summit; from the apex a single long black hair, and five or six short hairs around the basal part; on the cross-ridges of each segment after 2 are many fine points, each with a short hair; 2 has a blackish dorsal patch, with many hairs, bent forward; feet brown; pro-legs green; head cordate, shining, black, thickly covered with fine low conical tubercles, varying in size, each with its hair. Duration of this stage about two days.

After Second Moult.—Length at 6 hours, $\frac{24}{100}$ inch; color black over dorsum to middle of side; a mid-dorsal black line, with a pale gray-green line or stripe on either side of it; on the cross-ridges many white points, each with long whitish hair; in some examples the lower part of the black area is mottled with green-yellow; in one was a greenish patch on mid-dorsum on front of each segment after 2; the lower half of side green-yellow; on this area, with the spiracles runs a blackish line overlaid by a yellow line; under side yellow-green; the spines now long, slender, tapering to a point, with a bristle at top and eight or ten about the sides; color of the five upper rows black, of the lower laterals yellow; head as at second stage, the tubercles more numerous, and more prominent, the one on each vertex a little largest, some white, some black, the hairs all black Duration of this stage less than two days.

After Third Moult.—Length 12 hours after the moult, $\frac{4}{10}$ to $\frac{4}{100}$ inch; scarcely different as to color and spines from previous stage; black, the lower part and under side olive-green; the white hairs over surface give a hoary appearance to all the black area; the tubercles on head still more numerous, varying in size, more decidedly cone-shaped, the one on vertex largest. Duration of this stage less than two days.

After Fourth Moult.—At 12 hours, $\frac{5}{10}$ inch. Two days later full grown.

MATURE LARVA.—Length $\frac{6}{10}$ inch; slender, of nearly even thickness from 2 to 11; the upper surface black, thickly dotted with fine yellow-white points or tuberculations, larger and smaller (some of the smaller white), the former placed on the cross-ridges of the segments, the others irregularly scattered on and between the ridges; each of these gives out a white hair; under side yellow-green; a black stripe passes between the pro-legs; 2, 3, 4 are black, and 5, 6, 11 to 13 have much black; in line with lower lateral spines a bright yellow line or stripe in long crenations, one of which extends the breadth of the segment, and another similar line is above spiracles, the two curves meeting at the spines; under these is a russet space making a pretty wide band, not evenly colored, and varying in individuals; a fulvous patch, always small, often a mere dot, above and back of each spiracle; occasionally the upper yellow line is reduced to a patch on each segment, and sometimes this is enlarged and conspicuous; spiracles sub-oval, yellow rings with black centres; feet black, pro-legs green; on 2 is a dorsal collar bearing several small white spinose processes, and many white hairs, which are bent forward; the spines are in seven rows, one dorsal, three on either side, being upper, middle and lower lateral; the dorsals run from 5 to 12, the first laterals from 3 to 12, the middle from 3 to 13, the lower from 5 to 12; the lower laterals are greenish-yellow, with bristles of same color, the 5 upper rows are black, from blue-black bases; all these spines are slender, tapering to point, with a white bristle at tip, and a few short black ones about the sides; along base are bunches of small green irregular tubercles, with hairs; head sub-cordate, black, shining, with many conical tubercles, large and small, mostly white but some black, the one on vertex a little larger than others, each with its hair; these hairs are black on upper part of face, white on lower. The black changes to dark brown as the larva progresses, and the russet band loses its distinctive color, becoming olive-green. Duration of this stage about four days.

CHRYSALIS.—Length from $\frac{85}{100}$ to $\frac{74}{100}$ inch; breadth across mesonotum $\frac{2}{10}$ to $\frac{22}{100}$ inch; across abdomen $\frac{19}{100}$ to $\frac{2}{10}$; head case much produced, the sides either excavated from extreme ends of the processes, or not at all. but tapering to end; these processes conical, rather short, the space between a little excavated; mesonotum prominent, rounded, slightly carinated, with a very small three-sided pyramidal process at summit; the excavation below mesonotum angular, the wing case considerably elevated, the process at base sharp, triangular; abdomen conical, marked on dorsal side by three rows of tubercles, corresponding to the three uppermost rows of spines in the larva; the mid-dorsals low, rounded, the others prominent on middle segments, those on mesonotum small, but all the sub-dorsals are sharp and conical; color variable; many examples are soiled white, with slight brown stripes on abdomen, one dorsal, one ventral, one on either side, the ventral extending from head case to posterior end; the whole surface specked and finely streaked with brown; and the whole, except the last 4 or 5 segments, bronzed more or less strongly; some examples have the wing cases unicolored, others clouded in two shades; other examples are wholly light brown, and largely bronzed; others are dark brown, the whole dorsal area lighter, and mottled and streaked with yellow-white; in these last is often no bronzing except of a few tubercles below mesonotum; others are blackish throughout, the bronzing confined to the tubercles last spoken of. Duration of this stage in July 5½ days. Following one individual:

Egg hatched,	July	3rd.
1st moult	"	5th–6th, in night.
2nd "	"	8th, 10 a. m.
3rd "	"	9th–10th, in night.
4th "	"	11th, 4 p. m.
Suspended	"	15th, 6 a. m.
Pupated	"	15th, 6 p. m.
Imago out	"	21st, about noon.

From hatching to pupation, 12 days; to imago, 17½ days. The last imago came out on 24th July.

Milberti does not live at Coalburgh, or so far as I know, to the south of this; but is a common species in certain localities throughout the Northern States from New England and New York west; also in Colorado and Rocky Mts. northward, and in the Pacific States, and even British

America. I used to take a few specimens in August in the Catskill Mts., but the species was rare there. I have had many eggs sent me from Truckee, Cal., and from Rochester, N. Y., the latter by Mr. H. Roy Gilbert. The larvæ sent me by Mr. Gilbert in former years refused our native broad-leaved nettle, and starved to death on it, so that I was obliged to import several roots of the food plant, *U. dioica*, from Rochester, and grow it in my garden. I desired to see whether or no this species in larva behaved like other of our Vanessans. Although so common, very little has been published of *Milberti* at any stage, or of its larval habits. Say, under the name *Furcillata*, figures the butterfly, 1825, and says it was several times observed in the North-west territory during the progress of the Long Expedition, but says nothing of the larva. Boisduval & Le-Conte, 1833, also figure the imago, and say of the larvæ merely that they live in cluster on a species of Urtica in the neighborhood of Philadelphia. Kirby, 1837, repeats Say, adding Canada as a locality. Harris, 1862, briefly describes the caterpillar and chrysalis ; says the butterflies are rare about Boston, but common in north-west Mass. and N. Hampshire, and appear in May and again in July and August. Prof. Lintner, Proc. E. Soc. Phil., 3, 61, 1864, describes the mature larva, in part at least from an alcoholic specimen, and the chrysalis ; and says there are two annual broods of the butterfly (at Schoharie, N. Y.), in April and August ; that the larvæ are usually very abundant on *Urtica dioica*, but that nearly all are destroyed by a parasite. Mr. Wm. Saunders, C. Ent., 1, p. 76, 1869, describes the adult larva, and says that the first brood of the butterfly appears (London, Can.) toward end of June, and again in August, but says nothing of larval habits. Mr. Scudder, in Syst. Rev., 1872, says of *Milberti*, that the eggs are laid in clusters on some of the terminal leaves of the nettle, that the caterpillars feed in close company during the earlier stages, but subsequently scatter. Mr. Henry Edwards, Proc. Cal. Ac. N. Sci., 1873, briefly describes the mature larva and chrysalis. Mr. T. L. Mead, in Report on Wheeler Expedition, 1875, says that *Milberti* larvæ were common about Denver early in June on nettles, and that almost every plant had many on it, in various stages of growth, while the females were still depositing their egg clusters. Mr. Scudder, in "Butterflies," 1881, p. 138, figures the butterfly, says there are two broods (in N. E.) in June and September ; and on p. 99, gives figure of cluster of eggs on under side of nettle leaf ; says the eggs are laid upon the under surface in large open patches, *in which they are rarely if ever piled upon one*

another, sometimes several patches upon the same leaf. On page 152, it is also stated that the species is *triple-brooded in Canada.* Finally, Prof. Fernald, But. Maine, 1884, briefly describes the mature larva, adding that the spines are arranged as in *V. Antiopa*, which, as I shall show, is in some degree erroneous. That is all I have been able to find of the history of this common butterfly, and that is very little.

The egg of *Milberti*, in shape and ornamentation, is like that of *Antiopa.* The young larva is like the young of that species also in every particular, so far as I can discover. Every hair in the one has its counterpart in the other. Of the second stage of *Antiopa* I cannot now speak, but of the third and subsequent stages, comparing them with *Milberti*, there is a difference in regard to the dorsal row of spines. In *Antiopa* these begin at segment 7 (head being No. 1) and end on 12, whereas in *Milberti*, as in Vanessa *Urtica* and *Polychloros*, also in all our species of Grapta observed, the dorsal spines begin at 5 and run to 12. (A table of the spines of Vanessa and allied genera may be found in Weismann's Studies, English Ed., p. 448, with interesting remarks on the relationship of all these species).

I received 7th May, 1885, from C. F. McGlashan, Esq., Truckee, Cal., a great cluster of eggs, on nettle leaf, mailed 30th April. There seemed to be about 200 eggs, but they were piled so that it was not possible to count them. The bottom layer was right side up, and the eggs square on their bases, so far as could be seen; at each layer above there was wider departure from this, till at the top the eggs were more or less on their sides. In the thickest part the cluster was five layers deep. These eggs failed to hatch. On 2nd July, the same year, I received three similar clusters of eggs from Mr. H. Roy Gilbert, of Rochester, N. Y., piled up in same way. I had a large plant of *Urtica dioica* in flower pot, the branches nearly two feet long, standing at an open window in my room. On the upper side of a leaf of this I pinned one cluster. In about six hours thereafter the larvæ were hatching, and a few hours later had gathered at the base of the leaf, on upper side, and were nibbling at and through the leaf. There was no web or shelter. The next day the larvæ were on same leaf, and had eaten it almost wholly, leaving the frame. There was still no web. The same afternoon they left this leaf, and had got on the end of the next branch and were eating the terminal leaves, still without web or any shelter. They were in a dense mass, and when not feeding, their heads were all protruded, and at the least alarm, as the

shaking of the leaf, all the heads wagged together. This would be a natural protection against ichneumon flies, etc. I have observed the same simultaneous wagging in young larvæ of *M. Phaeton*, as an ichneumon fly was hovering over them. This habit my larvæ kept up through the second stage. The first moult was passed while they were all piled together. The habit in feeding during the second and third stages was as in the first, no web, no shelter, all in bunches. But after third moult part of the larvæ protected themselves in the manner of Grapta *Comma*, eating off the main ribs at the base of a leaf on under side, whereby the leaf drooped. The edges were drawn together pretty closely and nearly to tip, and several larvæ might be found therein. One small lot of larvæ were on upper side of a leaf at the base, and had drawn the edges together for a half inch from base, making an imperfect shelter, but the ribs were not cut and the leaf stood in natural position.

At fourth moult I had a fresh plant ready and the larvæ were transferred. They scattered about, bent and closed leaves as in previous stage, and in some of these were three and four individuals, in others but one. But sometimes the leaf was not bent, and was closed from end to end nearly, a single larva lying therein.

The weather was clear while I was feeding this brood, and at no time was there any spinning of a web, or spinning at all beyond what was necessary to close the leaves. From what I saw, I should say that the larvæ in the early stages were highly gregarious, that after third moult they were much less so, and after fourth (and last) had lost most of that habit. But had the weather been cloudy, or stormy, they might have acted differently, and protected themselves more or less by a web.

I asked Mr. Gilbert to observe what he could of *Milberti* in natural state. He wrote 15th July: "The eggs, so far as I have observed, are always eight or ten inches below the top of the nettle, and usually in cluster on under side; *but on one occasion I found them loosely scattered over the upper side*, covering nearly half the leaf. In rough, windy or showery weather, the young larvæ may spin a web on under side of the natal leaf. I have seen this twice, and it seemed to me only a temporary expedient to avoid the rain and to secure a safe foothold. But they generally go to the top of the plant and spin a web which covers the terminal leaves, and by additions come to extend for three to five inches down. My opinion is that if the weather be rough when the larvæ are hatched, they rest on the natal leaf; if fair, ascend. When very young there are

no stragglers, but towards maturity the larvæ scatter, the main body of the family keeping together till nearly grown. The 'nettles,' as we designate a certain spot, is a patch of that plant covering more than three quarters of an acre, lying on each side of a lane. I have seen perhaps forty families of these larvæ feeding there at one time, but never under the shade of trees which cover much of that ground. The larvae were always out in the sun. I have found the larvae will starve rather than eat the broad-leafed nettle."

Again, 17th July: "I visited the nettles yesterday. Found but one group of larvae, they about ¾ inch long. A bright-colored bug (Hemipter) with a long beak was active in picking off the larvae. I found four in a bent and closed leaf with one larva of *G. Comma;* six in a similar leaf; two in a leaf that was closed but not bent, two unprotected on the under side of a leaf, and one in plain sight on upper side. Found also a bunch of eggs just hatched, and the larvae had crawled to under side of the leaf and lay like a flock of sheep, heads up."

Again, 20th: "Found one group of about 200 larvae, all on upper sides of two opposite leaves, and a few inches below a web at top of the plant. These larvae measured 1⅞ inch" (at or about 3rd moult).

"Another group, measuring ¾ inch" (after 4th moult) "were hidden in closed leaves on different stalks. Part of these closed leaves had the ribs cut, and these were crowded; the closed but uncut leaves had from one to four tenants. I have often noticed and know that after the last moult, the larvae scatter and feed openly. Can see a family several rods away where they are numerous."

I separated several of my larvae at one stage or other of their growth and gave leaves of our common broad-leafed nettle. At first they refused the food, then nibbled a little, and finally eat some leaves. But none of these larvae reached pupation, nor even passed a moult. They dwindled away and died. The same thing happened with larvae sent me in 1884. Mr. Gilbert reports a similar experience, as before said.

Specimens of the butterfly from the western plains and to Pacific have not the bright coloration seen at the east. They have a faded look.

ELAPHIDION VILLOSUM, Fabr.

BY FREDERICK CLARKSON, NEW YORK CITY.

There is in the study of Entomology a fascination and delight that captivates the imagination, and renders the enthusiast liable to construct

theories based upon such slender foundations that they fail to reach the dignity of assured facts. This, I think, may be said of much that has been written concerning the habits of this beetle. The record which I have thought proper to make relates to veritable facts, but whether in the particular instance referred to they are to be regarded as extraordinary and not of common occurrence, may be a problem yet to be solved. I trust that in offering this paper I may not be thought presumptuous in differing with so distinguished Entomologists as Drs. Harris and Fitch, yet as my observations do not bear out the conclusions which they have reached, and apprehending that the best interests of the science are served by that record or enquiry which relates to the discovery of facts, I make no apology to these fathers in the science for transcribing in relation to this subject views somewhat dissimilar to theirs.

Dr. Harris says that if a burrow be split open in winter, it will be found to contain the larva, which in the spring assumes the pupa form, and in June or July is changed into a beetle. He is in accord with Dr. Fitch concerning the periods of transformation, and holds similar views with him as to the habit of pruning. Dr. Fitch, I think, unduly exalts the instincts of these beetles as illustrated in their larval habit of pruning the twigs and branches of the oak, contending, as he does, that the twig or branch is eaten away by the young larva for a small space, and left supported only by the bark that the autumn winds may fell it to the ground, and that the environment of its new condition is necessary to the transformation of the included larva. This is substantially what each writer has to say upon the subject, though Dr. Fitch's report is very lengthened and rather extravagant in imaginative conclusions.

These oak pruners were very abundant in Columbia County, this State, in the season of 1878. The September winds brought showers of twigs and branches to the ground. I examined many of them, and found each to contain the larva, nearly full grown, in tunnels measuring from ten to fifteen inches long. I gathered five goodly sized branches just after they had fallen for the purpose of illustrating the burrows in my cabinet of nest architecture. The branches remained on a table in a room having very nearly the condition, thermometrically, of the temperature without, until the early part of November, when I opened them for the purposes already stated. I was astonished to find that every burrow contained the beetle; the transformation, therefore, from the larva to the imago was completed in less than eight weeks—how much less I know not—and

without the surroundings as narrated by Drs. Harris and Fitch. I am therefore inclined to the opinion, born of these facts, that the transformation, barring strong winds, is as likely to occur in the tree as on the ground, and that the branch is eaten away by the young larva not for the extraordinary reasons as cited, but for the more probable one, to prevent the flow of sap, which, if not checked, may render the wood fibre unwholesome to the larva, or possibly affect injuriously the later condition of pupa and imago. It would appear, moreover, that the beetle is developed in the autumn, and remains within the burrow during the winter.

MONOGRAPH OF THE EMBIDINA.

(Continued from page 178.)

BY DR. H. A. HAGEN, CAMBRIDGE, MASS

10. *Embia Mauritanica.*

E. Mauritanica Lucas, Explor. Alger., vol. iii., p. 111-114; Neur. pl. 3, f. 2, a-n. Cuvier, Edit. Masson, Neur., pl. 106, f. 8 (copy of Lucas' figure).

E. Mauritanica Lucas, Ann. Ent. Soc. Fr., 1859, ser. iii., vol. vii., p. 440-444.

I have never seen this species, and give the substance of the very detailed description of Mr. Lucas.

Winged imago: Length of body 13½ mill.; exp. of wings 16 mill. Body rufo-fuscous, rufous-villous; head longer than broad, flat, smooth; depressed transversally behind the eyes; frontal part reddish; eyes reniform, black; antennæ 15-jointed, smooth and not villous (as in *E. Savignyi*), a little paler than the head; the joints after the 6th successively longer; labrum and palpi dark rufous; max. palpi thinner than in *E. Savignyi*, the two apical joints longer; labial palpi also more slender and the apical joint longer; prothorax a little longer than in *E. Savignyi*, with a transversal sulcus in the apical third; mesothorax anteriorly between the wings on each side with a yellowish transversal tubercle; metathorax similar. Legs dark rufo-fuscous, with the usual dilatation of the femur and the basal joint of tarsi of fore legs. Wings as long as

abdomen, light reddish brown, smoky, with pale longitudinal bands; sector trifid, four transversals in the cell, and one in the space below (after the figure). Abdomen light rufous brown, smooth above and below, somewhat hairy besides; appendages two-jointed, hairy, the apical one thinner, longer; the apical ventral segment below is to the left strongly truncated and excavated; in consequence of this asymmetry the basal joint of the left appendage is very short, broad, flattened and somewhat abortive. Mr. Lucas found the same asymmetry in each of the dozen of specimens collected by him. To decide the sex of his specimens he cut open the abdomen of several of them, and found all to be females.

Wingless larva (after Lucas): Length of body 13 mill.; breadth 2 mill. Rufo-fuscous; head ovoid, smooth, sparingly villous, above somewhat depressed; eyes reniform, dark fuscous, not prominent; antennæ rufo-yellowish, with yellowish hairs, as long as head and prothorax (after the figure), 18-jointed, joints about alike, successively shorter, the last as long as the first, but thinner, rounded on tip; palpi yellowish. Prothorax very short, anteriorly with a transversal sulcus; mesothorax twice longer, anteriorly with a much deeper transversal sulcus; base narrower; metathorax very short; no traces of wings (after the figure). Legs (after fig.) yellowish, the basal joint of the tarsi of fore legs dark fuscous, with the usual dilatations. Abdomen with nine dorsal segments; appendages rufous, the basal joint a little longer; the figure of the end of abdomen shows the last dorsal segment triangular.

Habitat.—Around Alger, especially near Milah and Constantine, the winged specimens living gregariously in sandy places in June on the stems of a dry *Scilla maritima;* very agile; 12 specimens collected. The larva is not very rare around Alger during the winter, living in small silken tunnels under humid stones; the larva is carnivorous and very agile.* Mr. Lucas, in his paper, Ann. Soc. Entom. Fr. 1859, l. c., states that he collected, April, 1850, at Medeah and Bogar, province Alger, some larvæ which were placed in boxes, but by chance forgotten till 1858. He found

* McLachlan, Embid., p. 376, says rightly: Hagen, Stett. Zeit. 1849, p. 56, said that nothing had then been recorded as to the habits. He (McLachl.) has overlooked the fact that my paper was written and delivered in 1848, and commenced to be printed in the same year. The continuation of Embidæ was printed February, 1849, before Lucas' work was published. The report of Lucas by Schaum, in 1851, contains nothing about the habits of Embidæ, nor any other report, as far as I know, before Lucas' second paper in 1859.

the walls of the box clothed with a very fine white silk, the network consisting of very small meshes and representing circular tunnels, in which the dead larvæ were found. Mr. Lucas has observed in the field threads of silk arranged near the entrance of the tunnels, and believes them to serve as traps or to give notice of the presence of insects. He believes the Embia to be carnivorous. The larvæ live isolated.

Concerning the larva, Lucas, Expl. Alg., p. 114, states that obliged to leave for Constantine in March, he put several larvæ in separate boxes together with some insects as food. After his return in October, he found all dead; only one had transformed to a winged imago. This interesting observation is the only one known of the transformation of the wingless form into the imago state. But then the nympha skin with the empty wing cases must have been in the same box. Though the observation of an eminently distinguished observer can not be doubted, still it is impossible that the imago could have transformed out of the wingless form without having before passed through a nympha form with visible wing cases. Mr. Lucas' observations are extremely interesting, in so far as he has stated the existence of winged females. The description of the internal female organs makes his statements entirely sure.

E. Mauritanica is very near to *E. Savignyi.* It is apparently a misunderstanding when Mr. Lucas, Ann. Soc. Ent. Fr. Bull., p. 98, states that I have united the two species in the Synopsis Embid., p. 21-22. Both species are there enumerated as different, and nothing is said about their relations. As I have never seen *E. Mauritanica*, I can state, after a careful study of the description and the figures, that both species must be very nearly related. It is to be assumed that Mr. Lucas has seen Savigny's type, described by Rambur, in the Jardin des Plantes. If he had seen other specimens I believe he would have mentioned the fact. Therefore his statements represent probably the comparison of his species with the type of Savigny. After all *E. Mauritanica* seems to differ by much darker colors, the lack of villosity of the antennæ of the imago (those of the larva are hairy), by the length of the last joint of palpi, by the asymmetry of the left appendage, and by less transversals of the wings.

11. *Embia Persica.*

E. Persica McLachl., Jour. Linn. Soc. Lond., vol. xiii., p. 382.

Female? Length of body 9½ to 10½ mill.; exp. of wings 13½ to 15 mill.

Nigra subnitida; caput vix in medio piceo tinctum; pronotum brunneum; antennæ nigrae, basin versus pallido cinctae, 24-articulatae, articulis duobus ultimis flavidis; alae angustae, fuliginosae, albido 5-striatae; venis fuscis. (McLachl.)

Hab.—Shahrud, Northern Persia. Three specimens collected by Mr Christoph in McLachlan's collection.

I have never seen this species; the detailed description must be compared in the original. There is no asymmetry noted, which is probably the reason that the author has considered them to be all females, with an appended? The species seems to be different from all described ones, but related to the two foregoing species.

12. *Embia Solieri.*

E. Solieri Rambur, Neuropt. p. 313, No. 4.

Larva, dry: Length about 9 mill. (or a little less than *E. Savignyi* Ramb.) Body rufo-fuscous, villous; head about quadrangular, a little depressed; eyes small, black, not prominent; antennæ reddish-yellow, a little longer than the head, villous, 18-jointed; 1st joint cylindrical, thicker than the others; 2nd short, 3rd longer, the rest globular. Prothorax narrower than the head, somewhat enlarged behind, about as broad as long, with a deep, transversal sulcus after the first third; mesothorax oblong; metathorax quadrangular; no traces of wing cases. Abdomen robust, broad, dark rufous, villous, a little shining; segments alike, twice broader than long, the last dorsal triangular, obtuse, symmetrical. Appendages (rudiments only present) reddish-yellow, the basal joint thick, short. The opening of the female genitals on the ventral side seems to be present. Legs ferruginous, femora partly darker; the femora and the basal joint of tarsi of fore legs dilated as usual; the only dried specimen before me shows these parts shrunk, but they seem less broad than in *E. Savignyi;* the middle legs are more dilated and stronger than usual.

Hab.—The specimen before me is labelled Spain. Probably it is the same mentioned by me (Stettin Ent. L. 1886, vol. xxvii., p. 285). I have studied the type of *E. Solieri* Rbr. and some other larva from Spain in the collection of DeSelys Longchamps, but I can not find my notes. At least Rambur's description agrees with the specimen from Spain, nevertheless, if my memory is not at fault, the specimen from Marseille is larger. It is very remarkable, that in the more than forty years since Rambur's publication no winged imago has been found, though the

wingless form is widely spread in southern France and in Spain, and seems to be frequently met with.

In Petit. Nouvelles Entoml. Paris, 1877, vol. ii., p. 182 (not compared), Mr. Bolivar, commenting upon Mr. Girard's opinion, that only one species of Embia exists in Europe, and that probably an importation, notes that a species is abundant in the larval form near Madrid, and is no doubt indigenous. Mr. Girard, l. c., p. 125, replies, and thinks the discovery not opposed to his hypothesis. McLachlan, l. c., p. 193, states that there can be no doubt as to perhaps more than one species living in Europe (of Record for 1877).

Mr. Lucas, Ann. Soc. Ent. Fr., 1880, Ball, p. xcvii,, had found in February, 1850, near Toulon, not far from the Fort Lamalgue,, larvæ of *E. Solieri* below the humid stones. The larvæ were rather agile, and live like those of *E. Mauritanica* in silk tunnels made in hollow places of the stones. During the whole larval time they have the power of producing white silk to make tubes or tunnels in which they probably undergo their transformation. Contrary to Rambur's opinion the larvæ, at least of *E. Mauritanica*, live isolated, and only the adults become gregarious.

Mr. M. Girard, ibid. 1881, Ball, p. cxxxvi., reported *E. Solieri* larvæ colleected by Mr. Xamben, near Port Vendres (Pyrenees Orientales), in March, below stones in silken tunnels, which are traps for insects. The species is very different from *E. Mauritanica* and *E. Savignyi*, and was also found by Mr. Lucas near Perpignan and Collioures. He adds that these localities harbor other southern forms, as *Paussus Favieri.*

Mr. Lucas, ibid, 1882, Ball, p. clxxxv., found near Amélie-les-Bains, end of December and January, 1882, below stones, a few *E. Solieri* larvæ, long 9 to 12 mill, with 16, 18 or 20 jointed antennæ. It is very rare that both antennæ of the same specimen have the same number of joints.

Mr. Lucas, ibid, 1883, Ball, p. xxvi., compare at some length *E.* Solieri, the imago of which is still unknown, with *E. antiqua* Piot., in the Prussian amber. He states that this species closely resembles in form *E. Solieri*, but differs by its longer antennæ, which nearly exceed the metathorax, though in *E. Solieri* they do not exceed the mesothorax.

McLachlan, Journ. Linn. Soc., vol. xiii., p. 376, states that he possesses *E. Solieri* from Hyères, collected by Mr. Pascoe under stones.

13. *Embia (Olyntha) Brasiliensis.*

Olyntha Brasiliensis Gray, in Griffith Anim. Kingd., vol. xv., p. 374, pl. 72, f. 2.

O. Brasiliensis Westw., Trans. Linn. Soc., vol. xvi., p. 373, pl. 2, f. 3.

O. Brasiliensis Walk., Neur. Br. Mus., p. 532, n. 1.

Winged form (male?) Length of body 16 mill.; exp. of wings 25 mill. (from Westwood's plate).

"Antennæ corporis fere longitudine, articulis 32; alae nervo 4 interno trifido. Piceo niger, prothorace supra femoribusque 4 antiois ochreis, antennarum articulis 10 ultimis albis, alis piceis, vittis albis inter nervos longitudinales, nervisque transversis tenuiter albo-marginatis." (Westwood.)

Hab.—Brazil, coll. British Museum, formerly in Mr. Children's coll. I have seen only the type, first described by G. Gray in Griffith and figured ibid. by Westwood; on the plate it is named *Embius? Brasiliensis.* I have omitted "palpi maxillares 4 articulati" in Westwood's description, as it has been corrected by Burmeister in 5 articulati for Olyntha, and this statement is verified by examination of the type by McLachlan, l. c., p. 378. The few words in Griffith contain nothing more, except that prothorax and femora are called fulvous instead of ochreous. Though there is no asymmetry stated for this species the figure by Westwood has the tubercle between the appendages drawn more to the right, and the figure in Griffith has a spine on the left side and the right appendage (by error) three jointed. In 1857, on my way to London, I had compared *O. Brasiliensis* in the museum at Berlin, and the type in the Museum at Halle, both from the same lot, and when I saw the type in London, I had the impression that the type of *O. Brasiliensis* was different from Burmeister's species, with yellow appendages. In the figure by Griffith they are black. On my return I compared again the specimen in Berlin, and found my first impression confirmed. As I had seen only single specimens, and was then very little acquainted with this family, I thought it more prudent in my Synopsis Embid, p. 222, to draw attention to the supposed difference. I should remark that Mr. Walker has copied Burmeister's description instead of Westwood's, though he had the type at his disposal.

14. *Embia (Olyntha) Batesi.*

Embia Batesi McLachl., Jour. Linn. Soc., vol. xiii., p. 38c.

Olyntha Brasiliensis ? Burm. Handb. vol. ii., p. 770.

Winged form: Length of body 7 mill.; exp. of wings 14 mill. (41 mill. is a misprint, McLachl.)

" Nigra vel nigro-picea ; prothorax flavo-ferrugineus ; antennæ nigrae, 20-articulatae, articulis quinis ultimis flavidis, pallide pilosis ; alae breves, latae, nigro-fuscae, albido 5-striatae."—McLachlan.

For the detailed description the original should be compared.

Hab.—Amazon's coll. by Mr. Bates, one specimen in McLachlan's coll. I have no specimen before me. The identity of Burmeister's species with *E. Batesi* is at least probable ; if it belongs to a different species, it would be new. The differences to be noted out of Burmeister's description are as follows : *O. Brasiliensis* Burm. has 30-jointed antennæ, " apice albis " ; *E. Batesi* only 20-jointed antennæ, the apical fourth five joints pale yellowish. Now, accepting that the antennæ of *E. Batesi* were incomplete, Burmeister's species, if identical, would not have the tip, but the apical half pale. Burmeister has, " femoribus 4-anticis ochraceis " ; McLachlan, " coxæ yellowish." Finally Burmeister says, " cercis albis " ; McLachlan, " the 2nd joint obscure yellowish with black hairs." *E. Batesi* is stated by McLachlan to be the broadest-winged species known to him.

15. *Embia (Olyntha) ruficapilla.*

Olyntha ruficapilla Burm. Handb. vol. ii., p. 770, No. 2.

O ruficapilla Walk. Neur. Brit. Mus., p. 532, No. 2.

Winged male ? Length of body 7 mill. ; length with wings, 11 mill.; exp. of wings 17 mill.

Dark fuscous, nearly black, shining, villous ; head and prothorax red ; head longer than broad, ovoid, slightly convex above ; a transversal furrow between the eyes, which are black and very prominent, and a sharp longitudinal impression in the middle of head behind the eyes ; epistom transversal, half as long as broad, rounded besides ; labrum short, somewhat triangular ; mandibles orange ; max. palpi fuscous, thick, 5-jointed, the last joint oval, larger ; labial palpi fuscous, the last joint longer, ovate ; antennæ dark fuscous, densely covered with dark hairs ; only 16 joints present, which are longer than head and thorax together ; thin, after 6th joint somewhat thicker ; 1st joint cylindrical, a little stouter, 2nd short; 3rd a little longer than 1st, 4th to 6th a little shorter than 3rd ; all following more elongate, fusiform, the two last ones again a little shorter. Pro-

thorax narrower than the head, longer than broad, enlarged at the base, flat, a transversal sulcus after the apical third. Legs rather long, dark fuscous, shining; fore legs with the femur, tibia and basal joint of tarsi equally long, compressed, dilated, the tarsal joint thicker, with a longitudinal furrow; the two apical joints short, the last one longer than the preceding; middle legs not so dark, more brownish, very little dilated, the basal joint of tarsus short, scarcely longer than the two following together; the whole tarsus very little longer than the tibia; hind legs with very strong, long, dilated femur; tibiæ shorter, less dilated, compressed; tarsus about as long as tibia, basal joint not dilated, about as long as the two others together; the second very short; all claws bent, sharp, much thicker at base, rufous. Abdomen black, villous, shining, one third shorter than the wings; last dorsal segment polished; appendages black, villous, very long; basal joint thick, straight, apical joint longer, thinner, a little narrowed in the middle. The abdomen is too much shrivelled to make out anything more; I can not see any asymmetry, at least not of the appendages. Wings about four times longer than broad, smoky black, rugulose, with four narrow white longitudinal lines, the anterior (fifth) wanting; venation dark fuscous; sector trifurcate; about five costals and five transversals in the cell; in the spaces below some transversals.

Hab.—Brazil. I have before me two dry specimens; one from the collection of the late Dr. Schneider in Breslau, Prussia, has only the label Brazil; it may have belonged to the same lot with Burmeister's types and those in the Berlin Museum, but it has not been compared with them. The other was collected by the late Mr. Appun in Venezuela; head and prothorax wanting.

In my Synops. Embid. p. 221, I had put *E. Klugi* Ramb., Neur. p. 313, No. 3, with a question mark, to *O. ruficapilla*. In my Syn. of N. Amer. Neur., p. 301, it was given as a separate species. I have never seen the type, which was collected by Delalande in Brazil, and belongs to the Museum in the Jardin des Plantes in Paris. Rambur has apparently omitted to describe the wings. If they had not been present, he would have named the specimen a larva, as in the two other cases. Otherwise his description, which is very detailed for the legs, contains nothing that would not apply to *O. ruficapilla;* perhaps his specimen was somewhat darker.

The specimen from Brazil before me presents in all the wings an inter-

esting anomaly of the venation, though the specimen from Venezuela has in all wings the usual venation. The apical end of the cell is usually formed by the radius and the upper branch of the sector meeting shortly before the tip of the wing, forming a curve from which a short vein emanates. Now in the Brazil specimen the upper branch of the sector runs straight to the tip of the wing; the radius ends a little before and is not connected with the sector by curving down, but by a straight transversal, parallel to the other transversals. The cell is therefore not closed, as usual, at the end by a curve. The radius is connected with the margin by a costal originating at the same point with the last transversal in the cell below. The same arrangement of the venation occurs only in *O. Westwoodi*. That it occurs in *O. ruficapilla* as an aberration is rather important, and it will help to a right understanding of the venation.

16. *Embia (Olyntha) Salvini.*

Embia Salvini, McLachl. Journ. Linn. Soc., vol. xiii., p. 380.

Winged male. Length of body 7 mill., exp. of wings 12 mill. (both approximative). Body black, sub-opaque, covered sparingly with dark hairs. Head very little longer than broad, about quadrangular, the sides very little sloping to the rounded hind angles; a large shallow depression on the middle of the disk above, in the centre of which is a very faint short elevated longitudinal line; eyes black, large, but less prominent than in *O. ruficapilla*, reniform; antennæ with only 19 joints present, which are nevertheless longer than head and thorax together, yellowish to 8th joint, the following successively darker, fuscous nearly blackish, polished; all with long fuscous hairs; basal joint cylindrical, stout, a little darker than the following, reddish yellow; 2nd small, as long as broad; 3rd as long as the two basals together; 4th half as long as 5th, pyriform; 5th to 10th successively longer, pyriform; all following shorter, a little thickened after the middle; labrum short, half as long as broad, rounded, yellowish at base and sides; the middle and margin blackish; max. palpi dark fuscous, thick, 1st to 4th joint short, about alike, 5th longer, sub-acute; labial palpi similar, last joint longer; all palpi clothed with paler hairs; mandibles black on tip; mentum large. Prothorax short, half as broad as the head, enlarged to the wings, with a faint median longitudinal impressed line and a deep anterior transverse sulcus, prolongated shortly along the oblique side-margin; mesothorax rather longer than broad; metathorax nearly quadrangular. Legs shining black, clothed

with pale hairs, tarsi somewhat castaneous ; fore legs strong ; femur, tibia and first joint of tarsus of about the same size, compressed, dilated ; the two last joints of tarsus small, short ; middle legs about alike, but the 1st joint of tarsus shorter, much less inflated ; hind legs wanting. Abdomen black, shining ; appendages long, blackish, clothed with yellowish hairs ; right appendage with the basal joint stout, apical joint longer, thinner, both straight ; left appendage broken. I can not make out any asymmetry, but I can not examine the dorsum of the last segment ; between the appendages, nearer to the left, a spiniform yellow sharp process, bent to above. Wings narrow elongate, smoky blackish, with five longitudinal narrow whitish lines (the 4th becomes confluent with the 5th before its apex on the anterior wings in McLachlan's specimen) ; venation fuscous ; sector trifid ; cell long with two transversals, and several more in the spaces below ; four faint costals. In the left anterior wing the cell is closed as usual, where the right anterior wing has the cell open and the venation similar to the specimen of *O. ruficapilla* from Brazil. In both hind wings the venation is even more irregular.

Hab.—One specimen collected by Prof. Sumichrast on the Isthmus of Tehuantepec, Mexico, in the Cambridge Museum ; one specimen from Central America taken by Mr. Salvin at Chinautta, at 4,100 feet elevation, in McLachlan's coll.

I have no doubt that both specimens are identical, and have followed closely McLachlan's description ; the only difference would be that the basal joint of the antennae is black in McLachlan's specimen and reddish yellow in mine.

(To be Concluded in November Number.)

ENTOMOLOGICAL CLUB OF THE A. A. A. S.

The meetings of the Club at Ann Arbor were held daily from the 25th to the 28th of August, both dates inclusive, and were very successful. The following among others were present and in constant attendance :— J. A. Lintner, C. V. Riley, Herbert Osborn, John B. Smith, D. S. Kellicott, O. S. Westcott, L. M. Underwood, A. J. Cook, E. A. Schwarz, Henry G. Hubbard, S. H. Peabody, Clarence M. Weed, Miss M. E. Murtfeldt.

In the absence of Dr. Morris, Prof. J. A. Lintner presided. Officers for the ensuing year are : Pres., Prof. J. A. Lintner, of Albany ; Vice-

Pres., Mr. E. A. Schwarz, of Washington; Secretary, Mr. John B. Smith, of Brooklyn.

Aug. 25.—The following papers were read: A Biographical Sketch of William LeBaron, late State Entomologist of Illinois; Notes on some Structural Characters of the Lepidoptera, by John B. Smith. The Family Position of *Euphanessa mendica*, by Geo. D. Hulst.

Aug. 26.—Notes on *Harmonia pini*, by D. S. Kellicott; On the Preparatory Stages of an Undetermined Cossus, by D. S. Kellicott; On the Principal Injurious Insects of the Year, by C. V. Riley. Messrs. Kellicott, Underwood and Osborn spoke on the same subject.

Aug. 27.—Messrs. Cook, Osborn, Smith and Riley continued the discussion of injurious insects of the year. Messrs. Lintner, Riley and Westcott discussed the ease and difficulty of raising certain larvae. Mr. Osborn gave some notes on the habitat of a Chironomous; Mr. Cook gave some notes on the functions of the secretion of Bark Lice *(Leucanium tilia);* also some notes on the Choke Cherry Tortricid, *Cacœcia cerasivorana*. Mr. Westcott gave some notes on the abundance of certain Coleoptera.

Aug. 28.—Random Notes on Mallophaga, by Herbert Osborn; Larval Longevity of a Species of Coleophora; Extract from a letter of W. H. Edwards, on some food plants of *P. ajax;* On a Peculiar Structure of the ♂ *Cosmosoma omphale*, by E. A. Schwarz. How shall we Create and Foster an Interest in the Study of Entomology? by John B. Smith. All the gentlemen present participated in this discussion, which was of great interest.

The following committee of arrangements for the next meeting was appointed: Chairman, J. A. Lintner, and Messrs. John B. Smith and C. V. Riley. Adjournment to meet at call of the President at the next meeting of the Association.

LE NATURALISTE CANADIEN.

We heartily congratulate our esteemed confrere, M. L'Abbé Provancher, upon the re-appearance of his magazine after the lapse of many months, and we trust that henceforth all difficulties may be removed, and that the Government of the Province of Quebec will continue the assistance which we understand was formerly given to the Editor.

ERRATA.—Page 170, line 14 from bottom, read small *l* for *lithophilus;* specific name, not name of a genus. Same page, line 13 from bottom, for *Hestonotus* read *Xestonotus*.—C. H. T. TOWNSEND, Constantine, Mich.

The Canadian Entomologist.

VOL. XVII. LONDON, ONT., NOVEMBER, 1885. No. 11

ENTOMOLOGY AT BRIGANTINE BEACH, N. J., IN SEPTEMBER.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

In the preceding volume of the ENTOMOLOGIST (vol. xvi., p. 186) an account is given of some of the Coleoptera found in September on Brigantine Beach, N. J.; and having been there this season from the 1st till the 18th of the same month, I propose to give a further account of some of the insects inhabiting that region.

Cicindela dorsalis Say is found in great abundance on the shore between the lines of high and low tide, keeping as close to the water as it can get. If too closely pursued it frequently takes wing, alighting in the surf and coming to the shore in the foam, from which it usually escapes before it can be taken. It is sluggish in its movements, running about a yard, then stopping, and so on alternately, and flying only when pursued, and then for but short distances. More than two-thirds of the females captured want either a part of an antenna or of a hind leg, these mutilations occurring on the right side in a large majority.

Cicindela hirticollis Say is likewise in as great abundance as the preceding, but does not mingle with it nor willingly pass the high tide line, inhabiting bare depressed places on the sandy beach surrounded by hillocks of white sand, on which it delights to bask in the hottest sunshine. It is a great lover of heat and light, and is sought for in vain except during a few hours of the warmest and brightest days. It is very wary and active, and by no means easily taken.

Cicindela repanda Dej. also occurs plentifully in bare places surrounded by grass, and on paths and roads where the ground is dark; when disturbed it rises and lights a short distance off in the short grass, where it is easily taken before it can again arise.

Though inhabiting contiguous territory, the habits of these three species keep them socially separate.

On the main land other Cicindelas occur in abundance. On the 14th, while there, I took in less than an hour sixteen specimens of *C. modesta*, ten of *vulgaris*, and two of *generosa*, and saw many others. I had only to stand beside one of the many bare spots that are common in the pine woods, and throw the net over the insects as they came to bask in the warm white sand. In these woods I also met with several females of a fine, large *Mutilla (occidentalis)*, black beneath, bright scarlet above, with a black abdominal band. The specimen I took measured .90 inch in length, and though the temptation to take others of so beautiful an insect was great, being unfortunately without forceps, prudence gained from painful experience forbade.

Brigantine is inhabited by many species of Carabidæ, most of which are widely distributed and not confined to maritime regions.

Calosoma scrutator Fab. occurs alive frequently, but is likely brought from the main land by the waves.

Pasimachus sublaevis Beauv. is found sparingly, there being now scarcely anything for it to live and shelter under; formerly it was abundant. The same remarks are applicable to *Scarites subterraneus*. *Platynus punctiformis* Say is plentiful, living under all kinds of debris and decaying grass. With it is found in less abundance *Pterostichus erythropus*. *Amara subaenea* Lec. and *A. musculus* Say are of common occurrence. The latter is pollenivorous as well as carnivorous, being often taken on the spikes of grasses in flower, as well as in the vicinity of decaying animal substances.

Dermestes Frischii Kug. was found as usual, and in considerable numbers. It seems to have immigrated to stay.

Nitidula ziczac Say inhabits dead birds, which are often met with. These do not become putrid nor breed Diptera, literally drying up, and in this state becoming the abode of *ziczac*.

Sphenophorus retusus Gyll. Of this only a few specimens were taken in former years, but this season it occurred in the greatest abundance. The larvæ evidently live in the culm, or on the roots of the beach grass, *Calamagrostis (Psamma) arenaria*. This is a very coarse grass with a culm frequently .25 inch in diameter. The loose sand drifting among it forms hillocks four or five feet in height, the grass still shooting upward as the sand accumulates, and throwing out roots beneath to retain it. There is nothing else growing there on which they could possibly live. The beetles were found in multitudes from the first to the sixth day of the

month, but after that time very sparingly. They seemingly emerge around the culms of grass, crawling slowly over the loose sand till they find mates, and always directing their course upward towards the highest point, probably on account of its being the warmest. They appear to require sunshine, warmth and dryness, not being seen when it is cloudy, cold or damp. After pairing the males soon die and lie scattered over the sand, but whether the female goes into hibernation or proceeds to oviposit forthwith could not be ascertained. In the latter case there is ample time for the ova to hatch and the larvæ to be well developed before severe frost, which would rarely affect them before the middle of November.

Sphenophorus cariosus Oliv. A few specimens of this beetle were found with *retusus*, and its larvae presumably live on the same grass, but, if abundant, its time of development must be earlier.

Sphenophorus costipennis Horn is found sparingly in hibernation under sods around the sand hills, and likewise undoubtedly lives in the larva state on the roots of the same grass, there being nothing else to feed on within a reasonable distance.

The foregoing species of *Sphenophorus* seem to prefer dry situations where there is no more moisture than naturally belongs to the soil.

Sphenophorus placidus Say is, on the contrary, of a more aquatic habit, being abundant on the salt marshes, where its larvae undoubtedly live on the roots of a very fine short grass that grows there densely, and is saturated almost daily with the water of the incoming tides. In September the beetle is found in great numbers in hibernation under drifted timber that has become much imbedded in the wet soil and grass, where for much of the time it must be immersed in salt water.

Sphenophorus pertinax Oliv. Occasionally specimens are found with *placidus*, but more commonly it occurs in hibernation under sods left in dry places by the highest tides, seemingly requiring less moisture than *placidus*.

All the foregoing species of *Sphenophorus* seem to be widely distributed except *retusus*, which, so far as known, is strictly maritime and not often taken, at least there are few with whom I exchange whose cabinets I have not supplied.

LEPIDOPTERA.

The species found on the island are not numerous. *Pieris rapæ* Lin. is abundant, though cabbage is little cultivated. I found over a dozen of

the pupae on the beach under a small board, and on searching for the food plant, discovered the larvae had fed on the *Cakile americana*—a curious maritime plant, which though belonging to the Cruciferae, is very remote from the cabbage.

Callidryas eubule Lin. Specimens were observed on the wing nearly every day along the margin of the ocean, flying apparently at the height of fifteen or twenty feet and about the same distance from the shore, so that their capture could not be effected, though I took a crippled one and thus ascertained the species. All appeared to be southward bound, flying steadily but slowly.

Colias philodice is annually represented by a few specimens. In the absence of clover, the larvæ probably feed on an abundant native species of Phaseolus that seems in perpetual bloom, and of which the butterfly appears very fond.

Danais archippus Fab. The multitude of this butterfly that assembled here the first week in September is almost past belief. Millions is but feebly expressive—miles of them is no exaggeration. On the island is a strip of ground from 150 to 400 yards wide and about two and one-half miles in length, overgrown with *Myrica cerifera;* after three o'clock these butterflies coming from all directions, began to settle on the bushes, and by evening every available twig was occupied. To see such multitudes at rest, all suspended from the lower sides of the limbs, side by side, as is their well known custom, was something well worth seeing. One evening I travelled more than half the distance of their encampment, and learned that it extended the whole length and breadth of the bushes. In the morning they gradually separated and did not appear unusually numerous during the day, but in the afternoon they came again as described. I found them on the second, the day of my arrival, as related above, and this was repeated daily till the sixth, the forenoon of which was rather calm and sultry; a storm of wind and rain came on about two o'clock p. m., continuing till midnight. The next afternoon few came to camp; the great army had disappeared—but, how? when? where to? During the next few days they appeared again in considerable numbers—about as they had been observed in former Septembers—but insignificant when compared with those that preceded. The males and females were about equal in numbers. Not a single stalk of their food plant (Asclepias) grows on the island. On the main land, seven miles distant, I observed several patches of *A. tuberosa* in full bloom, but saw neither larva nor

butterfly; and as I learned that this plant is plentiful in that part of New Jersey, a scarcity of food will not account for this migratory habit. Neither will a scarcity of timber in which to hibernate, for this is super-abundant. For a good account of this butterfly see Riley's 3rd Missouri Report, p. 143; American Entomologist, vol. 3, p. 101; CANAD. ENT., vol. 12, p. 37, 38.

Pyrameis huntera Fab. is quite common, its food plant *(Gnaphalium polycephalum)* growing there abundantly.

Deiopeia bella Lin. This pretty little moth flies in the hottest sunshine and is excessively abundant. The food plant of the larvæ is unknown to me, but the imago frequents the flowers of a maritime species of Solidago.

Spilosoma acraea and *virginica.* The larvae of these two species were seen, but not in great numbers.

Anthera polyphemus. The larvae occur in abundance, and might be collected by the peck from the Bayberry bushes, on the leaves of which they feed. There is a marked difference between the imagos produced from the coast larvae and those raised here, the former having the colors brighter and the red on the wings deeper and more extensive.

Hyperchiria io. The larvae are likewise found on the Bayberry bushes, but being a general feeder, it abounds on many plants, especially such as are cultivated. It is in bad repute with the natives, one of whom informed me that its "sting" was certain death in about fifteen minutes, the only remedy being several liberal "whiskies" taken immediately.

I noticed the larvae of three or four other species of Bombycidae, and a few Noctuidae; but the place does not seem to be congenial to many species of the latter family.

The hymenopterist would find several interesting things in his line there. I observed two species of small Mutilla living in colonies in the sand hills. There are at least a dozen species of sand wasps, all seemingly solitary and in constant search for prey. There is a black species about one inch in length that I have frequently seen pounce on an unsuspecting Crustacean (sand crab) of at least twice its weight, give it a quick stab, and then haul it rapidly off to its burrow in some convenient sand hill.

I close this paper with a brief notice of a young but very enthusiastic entomologist, whose acquaintance I formed there, Master Lewis Barber, two and one half years old, a grandson of the proprietor of the hotel. This young gentleman spends all his leisure time—all that is not occupied in eating and sleeping—in collecting insects in all orders except Hymen-

optera, and is never happy unless he has some living thing in his hand. He takes particular delight in catching that ferocious Dipter, the green-headed fly, which he dexterously holds by the legs, greatly admiring its buzzing, and can not be induced to go to bed without having one of them, or something else, in his fist. His captures are never killed nor tortured, but dexterously thrust into a tin box with a sliding lid, which he carries with him; there he puts what he calls millers, grasshoppers, crickets and bugs. When he takes anything, he examines it with as much interest and gravity as his older brethren. He has no fear, handling caterpillars and worms with great composure, to the intense disgust of his mother and his lady acquaintances, who say the more hateful and horrid a thing is, and the more it wriggles, he likes it the better. His admiration was unbounded when I presented him with a larva of *Polyphemus*. He cares little for the companionship of other children unless they join him in catching insects. This entomological disposition was manifested, his mother says, before he could crawl, and all her endeavors have not in the least tended to wean him from what she calls "such horrible and disgusting playthings."

Perhaps I am now writing the first page of the biography of a renowned entomologist of the future. Who knows? This sketch will recall to such as have read "The Life of a Scotch Naturalist, by Samuel Smiles," the childhood days of Thomas Edward, associate of the Linnaean Society. Those who have not, have neglected one of the most intensely interesting biographies ever published.

MONOGRAPH OF THE EMBIDINA.

(Continued from page 199.)

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

17. *Embia (Olyntha) Mülleri*, n. sp.

Wingless form, female? dry. Length of body 12 mill.

Body large, stout, black, very sparingly clothed with yellow hairs; shining, the head alone semi-opaque. Head large, flat, scarcely longer than broad, a little narrowed to the occiput; hind angles rounded; a shallow impression above with a short longitudinal engraved line; eyes black, small, not prominent; antennae only 21 joints present, which are as long

as head, pro- and mesothorax; black, with yellow hairs, the 10 last joints strongly polished; 1st stouter, cylindrical; 2nd short, annular; 3rd cylindrical, as long as first; 4th and fifth very short; the rest successively longer, nearly pyriform, the last ones about ovoid. Epistom half as long as broad, sides rounded, front margin widely notched; labrum large, a little narrower at base, front margin rounded and a little yellowish, as well as the sides of the epistom; max. palpi dark brown, villous, stout, compressed, the three basal joints short, equal, 4th longer, obliquely truncated at tip, 5th a little longer and larger, ovoid; labial palpi compressed, broad, 1st very short, 2nd about as long as broad, 3rd longer, the broad apex rounded. Prothorax a little longer than broad, behind a little broader; narrower than head; side margins nearly straight; a transversal sulcus after the apical third; a fine engraved median longitudinal line; mesothorax broader and longer, flattened; near the anterior margin a transversal impression; the anterior angles rounded, a little swollen along the sides; disk with a large shallow impression; metathorax quadrangular, shorter but as broad as the mesothorax; impression near the anterior margin stronger; anterior angles more inflated, behind them a transversal small furrow, as indication of a separation; in mesothorax and metathorax the anterior margin and angles pale yellow; the "segment médiare" connected with the metathorax short, rounded before. Abdomen flat, one third less broad than the thorax, shining, very hairy; dorsal segments alike, transverse, short, the last one larger, rounded; appendages large; basal joint short, broad; apical joint much longer, ovoid; the two last ventral segments with a median longitudinal deep furrow. I can not see a genital opening, these parts being shrivelled up. Legs strong, very hairy, black shining; fore legs reaching the tip of mouth parts, femurs long, compressed, dilated; tibiæ alike, shorter; tarsus with first joint shorter than tibia, bent to below, dilated with a median furrow; no spine; the two apical joints small, much shorter; middle legs similar but shorter, thinner, very little dilated; hind legs as stout as the fore legs, femur much dilated, tibiæ shorter, not dilated; tarsus short, yellowish, basal joint less than half of the tarsus, cylindrical, stouter than the following ones, of which the 2nd is very short, the 3rd as long as the 1st. I see no asymmetry of the end of abdomen, but those parts are not in good condition.

Hab. One specimen from Itajahy, S. Cattarina, S. Brazil, collected

1879, by Dr. F. Müller, to whom the Museum is greatly indebted for interesting specimens and biological notices.

The specimen arrived in a letter, and is a little crushed, perhaps flattened. It is the only wingless specimen of Olyntha seen by me. I suppose it to be a female, because no male genitals between the appendages are to be seen, and the last ventral segment has a longitudinal furrow (or is perhaps split). There is no female of Olyntha known; if the females are colored like the males, this specimen belongs to a new species. The apparent indication of wings looks decidedly as when they are abortive and will never be developed. Therefore it can be assumed that the specimen is a female imago, or if winged females should exist, a wingless form similar to those of the Termitina.

HISTORY OF THE FAMILY.

Latreille, Familles nat. du règne animal, Paris, 1825, p. 437, at the end of the Termitines, says: "Les genres Termès, Embie (voisin du précédent, mais à antennes différentes)." In the German translation by Dr. Berthold, 1827, p. 435, the French expression Embie is given as Embium. Latreille, in Cuvier's Règne Animal, new (2nd) edit., 1829, vol. v., p. 256, states in a foot note: Some insects of the southern parts of Europe and of Africa are related to Termes, but with the head broader than the prothorax, three-jointed tarsi, wings not longer than the abdomen or none, with compressed legs, the two anterior tibias (sic!) much broader, without ocelli, and the thorax elongate form, the genus indicated in the Familles Nat. with the name Embie (Embia). It has been figured in the large work on Egypt. Indeed the celebrated Savigny, in Descr. de l'Egypte Zool. Neuropt., pl. 2, f. 9 and 10, had figured one species with numerous details (*E. Savignyi* Westw.) The plate was drawn and engraved between 1805 and 1812, but not published before 1825. There are on the plate only the names of the families, even the Termitines wanting among them, but no names of the species. In the meantime the unfortunate Savigny had become blind, and an Explication Sommaire of the plates by V. Audouin was published in the last months of 1825. The note concerning Embia is as follows: "The two insects, figs. 9 and 10, form a new genus, named by Latreille, Famil. Nat. p. 437, Embie, which he places near Termes. M. Savigny has established the same relation by placing Embia on the same plate at the side of Termes." I may remark

that the two insects of which V. Audouin speaks belong to one and the same species; fig. 9 represents the insect from above, fig. 10 from below.

Mr. R. Gray, in Griffith's ed. of Cuvier, vol. xv (Insects, vol. ii., 1832) p. 346, translates Latreille's note and describes briefly a new species from Brazil as a new genus, *Olyntha Braziliensis*. It was separated from Embia by having the antennæ as long as the body, the thorax much longer and more separate from the head, which is rounded posteriorly, the terminal joints of the palpi rather longer. It is figured (magnified) on pl. 72, f. 2, by Westwood, and named on the plate *Embius? Braziliensis*, J. R. Gray. The type formerly in Mr. Children's collection is now in the Brit. Museum.

Prof. J. O. Westwood in Trans. Linn. Soc. Lond. 1837, vol. xvii., p. 369-374, pl. 1 (read March 4th, 1834) published: Characters of Embia, a genus of insects allied to the white ants (Termites), with description of the species of which it is composed. He describes three species which he places as three sub-genera of the genus Embia, after single specimens, one of them, *Embia Savignyi* West., only after Savigny's figures. The second, *Oligotoma Saundersii* Westw., from Bengal (the type now in the Brit. Museum); the third, *Olyntha Braziliensis* Gray, formerly described in Griffith. The sub-genera are divided in such with 5-jointed palpi, antennæ shorter than the prothorax, with less than 20 joints (Embia and Oligotoma), and with 4-jointed palpi, the antennæ about as long as the body; the 4th vein trifid (Olyntha). The first group was divided by the 4th vein trifid (Embia) or bifid (Oligotoma). The numerous details figured give to his work a permanent value. The genus Embia is said to combine Termes with Eusthenia, a Perlid; why is not stated.

Burmeister, 1839, in his Handb., vol. ii., p. 768, elevates his four species to a family of equal value with the Termitina, and brings the Embidæ to his Tribus Corrodentia. He describes four species, one new, *O. ruficapilla*. But his *O. Braziliensis* is not Gray's species, and belongs to *O. Batesi* McLachl. He corrects the number of the joints of the maxillary palpi by Westwood for Olyntha, which has indeed five joints, as the others. Burmeister elevates the three sub-genera of Westwood into genera.

Rambur, 1842, Neuropt. p. 310, places the Embides as a family near the Termites. His general characters are excellent; only four species are described, and very well. Three of them are believed to be new, but his *Emb. Latreillii* is *O. Saundersii*, and his *E. Klugii* probably *O. rufi-*

capilla. The last one, *E. Solieri*, from Marseille, is only known in the wingless state. Rambur disbelieves that Oligotoma and Olyntha are generically different from Embia.

Hagen, 1848, had composed a review of the literature concerning the Neuroptera *(sensu* Linn.) ; the part containing the Embidina was printed February, 1849, Stett. Ent. Zeit.

Mr. H. Lucas, in his splendid work, Expl. scient. de l'Algérie, has described and figured his new species, *Embia Mauritanica*. This publication and the later one in 1859, have in fact opened the way of a better knowledge of this interesting family. Nothing was known before on the habits and nothing on the internal anatomy and the sex of the species. As the expensive work of Mr. Lucas is not accessible to students, I prefer to translate the following important passage given in a foot note, vol. iii., p. 112 :

As I liked to know to which sex belongs this (winged) form, I dissected several specimens (only 12 were collected). The ovaria are very elongate, covered by a very fine membrane, made more resistant by longitudinal fibres, giving a striated appearance. The ovaria are united internally, forming a kind of very elongated parallelogram, which covers the intestina in the whole length of the abdomen. The egg tubes are straight, parallel, very long, thick and fusiform ; toward the thorax the tubes are successively thinner, prolongated in a thread, which is attached together with the fibres to the first segment of the abdomen. Toward the end of the abdomen the tubes are recurvated suddenly at their hind end to form combined a very short oviduct, nearly null, with many lateral tubiform vessels, which are very irregular, nodulose, embracing themselves and recurvated in all directions (Lucas).

Mr. Lucas states after the result of his dissections, that all twelve winged specimens at his command are females, and that all showed the same asymmetry of the last segment of the abdomen and of the appendages. The winged male is still unknown. I have to remark that the females of *E. Mauritanica* are the only known winged females and the only known with asymmetry of the tip of the abdomen. McLachlan, l. c., p. 382, has stated the three specimens of his *E. Persica* as questionable females (all ♀?), but does not say why, nor does he mention symmetry or asymmetry of the tip of the abdomen ; therefore more detailed information would be desirable.

The detailed description of the ovaria by Lucas is also very important

for the systematic position of the Embidina. Indeed it disposes for ever of the claims of relation with the Perlidæ, of which the peculiar and very different form of the ovaria is well known. The ovaria of all groups of the Orthoptera are different, as far as known to me, and among the Pseudoneuroptera the Psocina differ also entirely. The only related form of ovaria we find among the Termitina, and indeed the inner organs of a virgin female of Termes is as similar as if the description by Mr. Lucas had been made after one of them. I think this similarity speaks indeed very strong in favor of the place of the Embidina near to the Termitina.

It should be remarked that the vol. iii. of the Expl. scient. de l'Algérie, though it has on the title-page 1849, is published later. At least De Selys Longchamps Revue des Odonates d'Europe, preface February 24, 1850, was not able to give the pages and plate of the Odonata described by himself for this work (f. p. 315, 318, etc.), and the Odonata in the Exploration follow the Embia.

For the only known facts up to the present concerning the habits of Embia, their living in silken tunnels spun by themselves, by the wingless and by the winged form, we are indebted to Mr. Lucas in the Explor. and in his later paper, Ann. Soc. Ent. Fr., 1859, and the corroboration of the same for *Emb. Latreillei*, ibid., 1883. He believes these insects to be carnivorous.

Fr. Walker, 1853, List of Neuropt. in the British Museum, p. 529-533, copies mostly Burmeister. Of the eight species mentioned, one is new, *Olyntha staphilinoides* from Brazil, but it belongs to Forficula.

Hagen, 1866, Verh. Zool. Bot. Gesell. Wien., collected in his Synopsis Embidinorum all known to him about these insects. He enumerates eleven species, two of them probably synonyms, two without description. Only seven were considered as doubtless.

Mr. R. McLachlan, 1877, Linn. Soc. Journ., vol. xiii., p. 373–384, pl. 1, published a paper which gave a new and strong impulse to the study of this remarkable family—"On the Nymph-stage of Embidæ, with Notes on the Habits of the Family." He had the good chance to study living insects imported with an East Indian orchid. The carnivorous habits of Embids, accepted on the authority of Mr. Lucas, became at least doubtful, as this species makes depredations on the roots of orchids. McLachlan gives a review of all known and published on Embids, and describes four new species, *Oligotoma Michaeli*, *Embia Batesi*, *E. Salvini*, *E.*

Persica, so that in all eleven are known. The genera Embia and Olyntha are again united, and separated by its trifid sector from Oligotoma with a bifid one. I have before under *O. Michaeli* given the details of this communication, and may only repeat that the so-called nymph (when the description and the figures are correct) can not be a nymph, because the characters of the wing cases of a nymph are not present. Perhaps it is a short-winged imago. Later he has described *O. insularis*, a new species from the Sandwich Islands.

Mr. Wood-Mason, 1883, Proc. Zool. Soc. Lond., p. 628-634, pl. 1, published "A Contribution to our Knowledge of the Embidæ." His attention was drawn to this group by McLachlan before his return to India. The memoir is very interesting, but there is left enough for further observations. After the perusal of the literature he had formed the opinion that the females were still unknown, and that they would prove to be wingless and probably larger in size. Of course he has not known Lucas's work, in which by dissection the female sex of winged imago had undoubtedly been proven for *Embia Mauritanica*. He discovered larvæ of a species apparently living in society. All were males probably of *O. Saundersii*. None of them showed the slightest traces of wings, but as the size of the specimens is not recorded, the larval state is at least not yet sure. He discovered also a large wingless female of *O. Michaeli*. I have before discussed this female, which seems to be doubtless a female imago, though its belonging to *O. Michaeli* is still a conjecture. He describes the male sexual characters of *O. Saundersii*, and speaks at some length about the wings of the same species, giving enlarged figures of the venation. I have to say more about them in the chapter treating the characters of Embids. A paper promised on the differences between the Embidæ and the Perlidæ has not yet been published. He considers the Embidæ as belonging to the true Orthoptera, being in some respects the lowest term, and in others the lowest term but one, of a series formed by the families Acridioidea, Locustidæ, Gryllidæ and Phasma.

I have now described seventeen species, only two of them I have never seen (*E. Mauritanica* and *E. Persica*), and three are now not before me (*S. antiqua*, *O. Braziliensis*, *O. ruficapilla*).

Characters of the Embidina.

HEAD.—The head is nearly free (caput liberum); the foramen occipitale is not just at the end of the head, as in Raphidia, but a little before and below; the membranous part of the prothorax slides gently to the

foramen. Head horizontal, small, flat, a little convex above, obovate or more or less quadrangular; the Y-shaped suture, so common in Termitina, Psocina, etc., on the upper side is entirely wanting; the eyes are always in the front corner, whereas in the other families they are placed in the middle of the sides or in the hind corner of the head. The eyes of the winged forms are large, prominent, reniform, the facets globose as in aggregate eyes; the eyes of the wingless forms are smaller, not prominent, and the facets flattened as in the composite eyes; therefore the head of wingless forms looks different, and is more ovoid; ocelli are wanting, but some species show a very small impressed line or groove, which calls to mind the obliterate middle ocellus of Blatta. The antennæ are as long as the body (Olyntha) or shorter, reaching the end of the metathorax or only the prothorax; the antennæ of the wingless forms are always shorter; they (antennæ) are inserted in a little socket in the anterior excision of the eyes; 15 to 32 articulated, but so fragile that it is difficult to find a specimen with the same number of joints on both antennæ; the basal joint is always somewhat stouter than the others, cylindrical; 2nd joint always very short, annular, 3rd joint always about as long as the 1st, and commonly followed by three shorter joints; all the following are longer, thickened toward the tip, or pear-shaped; the last one more or less ovoid. The epistoma is short, broad and united with the labrum by a membranous rhinarium; the labrum is large, nearly orbicular, cut off at the base; or it is more quadrangular, broader than long, or shorter, largely rounded in front. The mouth parts, at least the palpi, exceed a little the labrum; mandibles strong, horny, with two to three teeth on tip; maxilla narrow with two teeth on tip; outer lobe narrow; palpi longer, strong, 5-jointed (4-jointed in Termitina and Psocina), the three basal ones short, equal; the last joint much longer, ovoid; 4th joint always shorter than the 5th, but sometimes about as long as the 3rd. Labium bilobed, large, sometimes (I have not material enough to decide this positively) with two very small pointed lobes between them. They are mentioned by Burmeister, l. c. 769, and are to be seen in two of the species in Westwood's figures. On the basis of the upper side of the labium is a long middle slit (as in Psocina), the opening of the spinning glands. It is figured by Savigny, l. c. pl. ii., f. 9, u. e., but not mentioned in the description, nor anywhere else. I am not sure if the inner pointed lobes mentioned before belong to the spinning apparatus; perhaps the homologous large inner lobes of the Termitina have been here and in Psocina transformed into a spinning

apparatus. The mentum is large, oblong or quadrangular, and inserted in a sharply-cut opening of the head.

Prothorax much narrower than head, long, enlarged behind, with sharp straight side margin; after the first third a transverse deep sulcus, mostly prolonged behind along the side margin; the part before the sulcus corresponds to the similar but broader part which covers the occiput in Termitina; the hind part is a little convex; a sharp impressed middle line often runs along the whole prothorax. The mesothorax and the metathorax are larger, quadrangular and about equal in the winged forms; on the tergum is a large triangular elevation, to the sides of which the hind part of the wings is attached by a membranous fold. The tergum of the wingless form is without this elevation, and among those forms the mesothorax may be larger than the metathorax. Each segment of the thorax is divided into three parts.

The wings are horizontal, of the same shape and size, long, narrow, three to four times longer than broad, rounded or elliptical at the apex, as long as the abdomen, or somewhat longer in Olyntha (I have seen no alcoholic specimens of Olyntha). The wings are not deciduous as in Termitina, a basal squama being wanting; indeed the wings are so strongly attached that I have never seen a specimen dry or in alcohol which had lost a wing. The attachment is made by the callus axillaris anterior, just on the side of the anterior angle of the mesothorax, and by the callus axillaris posterior a little behind the former and more dorsal; the membrane of the hind margin of the wings is firmly attached by a membranous fold along the whole margin of the ob-triangular tergal elevation; the same attachment is found in Ephemerina, and is homologous to the membranula accessoria of the Odonata. The callus ax. anterior sends a strong vessel in the wing, forming the subcosta and the mediana; the callus ax. posterior sends from beneath in the wing the submediana and the post-costa. I was not able to find tracheæ in the wings or veins. The costa, which is a real vein, originates from the subcosta; the vein along the hind margin can be followed mostly to the middle of the wing, and originates from the post-costa. The membrane of the wings is more or less rugose, similar to the wings in the group of Calotermes, including *C. verrucosus*, *pusillus*, *rugosus* and related species. The rugosity is effected by numerous little pits bearing a very small hair in the centre they are more frequent and more densely placed on or near the veins, and seem then to form a kind of socket; a series of longer hairs is found on

the veins, or indicate their place when the veins themselves are obliterated. By means of these series of longer hairs there can be located between the submediana and post-costa three obliterated, or rather undeveloped, veins in *O. Westwoodi.* I can not find any sure trace of the sieve-plate, which is common at the base of the wings of the Psocina, unless it is represented by a short double series of approximated larger holes near and partly upon the base of the post-costa. The coloration of the wings is remarkable, being blackish, fuscous, fuliginous, or at least fumose, with five narrow white longitudinal bands between the veins. As these bands follow longitudinal folds or deepenings of the membrane between two veins, they perhaps represent undeveloped veins. But I was not able to discover a series of longer hairs in these white bands. Moreover the smoky dark wings of the Termitina with a number of undeveloped veins, never show similar white bands, which indeed seems to be characteristic for Embidina. The ingenious assumption of Mr. Wood-Mason, l. c. p. 633, that the white bands represent the original hyaline color of the wings, and that the dark veins are broadly bordered on both sides with brown or black-smoky, as to leave only narrow streaks of the ground color visible, is worthy of consideration. Of the veins, the sub-costa on its origin and the post-costa are usually the darkest and largest ones, but the mediana is the largest in its whole length except at base. The mediana is accompanied on both sides by a dense series of rugosities which form (Olyntha) together with both margins of the mediana, four approximated blackish lines.

With the intention to make my descriptions easy for comparison and to avoid any confusion, I have always used the names of the veins given in the descriptions of Westwood, McLachlan and Wood-Mason. I give here the nomenclature of the veins used by me in all my neuropterological papers since 1846, because the origin and the comparative value, and the homology of the veins, become more evident. My detailed paper on the wings and veins of the Odonata, made in 1846, was to be printed at the end of the monographs on Odonata, and the nomenclature was accepted by De Selys-Longchamps and used in all subsequent papers. The monographs of the four sub-families still wanting were interrupted, and the parts ready for the general volume (wings, antennæ, legs) remain still unpublished. I had then of course not known the nomenclature used by Heer, in which Kirby's names are partly accepted, as his work was published in 1847. As Heer's nomenclature has never been used except in

some papers on fossil insects, I have used my own, and have given, Stett. Ent. Zeit., 1870, a more general paper on the rational nomenclature of the venation in the wings of insects. The plate accompanying this paper was made at my request by my old friend, Zeller, as I was then on a long voyage. The numbers and the f. at veins on the plates are all Prof. Zeller's, and very different from my views. As the plate had been published before my return, it has not been given any explanation, because the plate did not illustrate my views.

I may add that I have studied carefully Dr. Adolf's recent papers on veins of insect wings, in the hope of finding a better explanation for the aborted or undeveloped veins, but without success. The costa runs as a true and strong vein along the anterior margin to the middle of the rounded apex of the wing, where it is commonly connected with the submediana. The costa is incised at its extreme base ; the very small part before this incision, which lies not exactly in the same line with the costa, is, together with the very minute part below it, homologous with the basal squama. The sub-costa is the strongest and darkest vein, straight, ending free in the basal third of the length of the wing, somewhat earlier in the hind wings. I am not able to confirm (even from wings in alcohol) Wood-Mason's statement that it would, if produced far enough, run into the costal vein. Sometimes it seems indeed more directed to the costa, but in other species *(O. Westwoodi)* it seems to run to the sinus of the mediana.

Out of the mediana (radius) originates at its base below the subcosta, and a little before it above the costa ; the mediana runs as a very large and diaphan vein (the subcosta is not diaphan) parallel to the costa to the apex of the wing. Shortly before the apex the mediana is bent down and united in a curve with the submediana. Out of the mlddle of this curve runs a straight, short vein to the apex, which as I believe belongs to the submediana. An abnormal specimen of *O. atricapilla* and both specimens of *O. Westwoodi* do not possess this curve in all the wings ; the mediana is connected by a straight transversal with the submediana, and ends shortly after this transversal obliquely in the costa. The mediana runs in the middle of a large sinus, "studded thickly on each side with microscopically minute setæ" (Wood-Mason), or between two sinuses following its whole length. I can not decide which view is better to be accepted, but I remark that a somewhat analogous sinus is to be found in a part of the wings of Psocina. I have remarked before that the four dark parallel lines described and figured for this place are formed of the

margins of the mediana and of the sinus. There are sometimes between mediana and costa in the apical part of the wing four or more not well defined transversals, and between the mediana and submediana four or less well defined transversals; as far as I am able to see, all these transversals are only connected with the sinus and not with the mediana itself.

The submediana (fourth vein, or forked fourth vein, Westw., McLachl.) enters the wing from below as a strong vein, and sends from beyond the base, before the end of the basal fourth of the wing, a much stronger vein, the post-costa, obliquely to the hind margin. The submediana runs parallel to the mediana as far off as these veins from the costa. The submediana runs straight to the tip of the wing; the part of this vein which is called by McLachlan the upper branch of the sector, is in fact the submediana itself. This is proved by *O. Westwoodi*, where the part considered as fourth sector is obliterated, and the part considered as upper branch is well developed. The abnormal specimen of *O. ruficapilla* shows the same arrangement. After all, as far as I know, when veins are partly or totally aborted, the branches are first to disappear, and are followed by the main stem. Therefore we have to call the vein which is again furcated after the middle of the wing the lower branch of the submediana. The space between the mediana and the submediana, closed by a curve before the apex of the wing, is properly called the elongated cell or discoidal cell, and is only wanting in *O. Westwoodi*. There are some, but always few (3 to 5) transversals in the cell. The lower branch may be bifurcated again (Embia, Olyntha), and in abnormal cases the branch also bifurcated, at least in one wing. In the spaces between these branches and below them are a few scattered transversals without much regularity. Near the base the submediana is connected with the mediana by a very short transversal (between 4^1 and *c* in fig. 2, Wood-Mason, l. c.) in the hind wings about opposite the origin of the post-costa, in the front wings a little later. This short transversal vein, examined with the microscope, is found to be combined of two branches, one originating from the mediana, and another from the submediana. The first one crosses the last one, and a series of hairs following it shows an undeveloped vein (the rudimentary first branch, fig. 3, *c*, Wood-Mason, l. c.) This connection is homologous to the arculus of the Odonata, or the cross on the base of the front wings of Palpares, etc. Such a connection is often found present, when the wing is to be stiffened for a more powerful flight, or to give to a delicate wing more stability. This connection is not always

exactly the same in Embia; in some specimens the two little branches seem to anastomose one with the other; sometimes the basal part of the submediana seems to be separated, or at least turned in an oblique angle; but I think after all that no serious objection against my explanation can be made. The post-costa is a very strong vein, running obliquely to the hind margin; from this point to the base of the wing runs a fine straight vein, the anal vein.

The whole large group of Orthoptera is very multiform. There is no help for the systematic student, if he is displeased by this multiform mass; nature has created it in this manner, and he has to accept it just as he finds it. Erichson proved some forty years ago that the so-called Pseudo-neuroptera belong to the Orthoptera, and every later careful study has but confirmed his views. It may not be amiss to state that I had in my manuscript of the Synopsis of the N. Amer. Neuroptera (sensu Linnaei) separated in a decided manner the Pseudo-neuroptera from the Neuroptera, as this is not so evident as it should have been in the printed book. The whole group of Orthoptera consists of a number of co-ordinate families, of which no connecting living forms are known to exist; probably they have perished in former times. This is far more conspicuous among the Pseudo-neuroptera, and indeed there is not a single living form known about which it is uncertain or doubtful if it belongs to Perlina, Ephemerina, Odonata, Psocina, Embidina or Termitina. To arrange these families, which are very different among themselves, with the small or large number of genera and species belonging to them, in an acceptable series, is still impossible.

After a detailed study of the wings of the Embidina, only the following statements can be given. Only the Termitina and Embidina have all four wings of the same size, shape and venation; some small differences among them are not of importance. The longitudinal veins have the same simple arrangement, or even more simple because less branched in Embidina. The most striking difference is the strongly developed basal squama of the deciduous wings of the Termitina; this squama is indeed wanting, or rather very faintly indicated in Embidina. The sub-costa ends suddenly in Embidina just as in Psocina, though it is complete in Termitina. The mediana in most of the cases is connected with the submediana before the apex in Embidina; among the Termitina only *Calotermes brevis* (Hagen, Monogr. Term. Linn., vol. xiii., pl. 3, f. 6) shows a somewhat analogous arrangement. The basal connection between the

mediana and submediana to stiffen the wings in Embidina, would be out of place in Termitina, where the strong horny basal squama served this purpose better. Nevertheless in some species such a connection seems to be faintly indicated upon the squama. Some Termitina (Calotermes) have also a small number of transversals below the mediana, and some have ill-defined transversals below the costa before tip. The structure of the membrane of the wings and of the veins is similar in both families, and unlike the structure of all other families. Finally, though the wings of Termitina are considerably longer than the body, and only as long as the body in Embidina (a little longer in Olyntha), there is, considering the wings, no place more natural for the Embidina than near the Termitina.

The legs are a very striking and abnormal feature among the characters of the Embidina; they are obviously shaped for burrowing by the compressed enlargement of some parts of these limbs. I have compared them with the burrowing legs of insects of other orders, and was rather astonished to find a very great difference in the arrangement, the attachment and the development of the fossorial limbs and their joints. I have tried without success to find in the literature some general considerations or descriptions of fossorial limbs. As their shape must be the consequence of purely mathematical principles, a general study of these limbs is still an important desideratum.

The legs of the Embidina are strong, the middle legs always considerably less than the other pairs; all the legs are comparatively long, the fore legs exceeding the head, the hind legs reaching nearly the end of the abdomen, at least longer than two-thirds of it; the legs of wingless forms are always shorter. All three pairs are equidistant and attached to the end of the respective segments; but the bases of the fore and middle legs are as far distant from each other as possible, indeed the legs are attached to the sides of the thorax. The hind legs, on the contrary, are approximate one to the other, so that the coxæ are very nearly touching the opposite ones, and are longer and broader than the coxæ of the two anterior pairs, which are short, cylindrical, a little incurvate. The fore legs have the femur, the tibia and the first article of the tarsus of about equal length and strength, dilated and compressed; the first article of the tarsus rather more dilated, depressed, incurvated, with a furrow above; the two other articles short, the first of them more or less thick; the claws are short, sharp and simple; between them is no plantula. The middle

legs are shorter, thinner, the femur somewhat inflated at the base above; the tibia and the first joint of the tarsus about cylindrical. The hind legs have the femur strongly compressed and dilated; the tibia strongly cylindrical; the basal joint about half as long as the tarsus, a little stronger, and with an external comb of short spines. I do not know if this comb is present in all species; the two apical joints similar to the middle legs, perhaps a little longer. In some of the wingless forms the first joint of the tarsus of fore legs has a strong external spine.

Are the fore legs burrowing legs? Till now no observation is recorded, though their form admits the supposition. That they give help in the spinning of the silken tunnels is very probable. Are the hind legs jumping legs? No observation is recorded, but they seem fitted for jumping.

Comparing the legs of Embidina with those of Termitina, no similarity or relation is to be found. The trochanters in all pairs are very and equally approximate in Termitina. Among the Psocina we find in *Atropes divinatoria* the trochanters of the two first pair widely separated one from the other one, and those of the third pair much more approximate. For other families a comparison seems of no avail, but there exist similar distances in Odonata nymphæ, in Ephemerina and Perlina. Inflated legs are not known among Pseudo-neuroptera, except in Ephemerina in the earlier stages, and these are burrowing legs.

The abdomen is long, about half the length of the body, a little less broad than the thorax, flattened above, cylindrical below; the dorsal segments about equal, transverse-oblong, more than twice as broad as they are long; last segment longer, the two before mostly shorter than the others; there are seemingly ten dorsal segments, but the first belongs to the metathorax (segment mediaire), therefore only nine belong to the abdomen; the dorsal segments are strong, chitinous, and united on the sides by a large membrane with the ventral segments; a longitudinal fold bearing the stigma. The ventrals are more hyaline, except the two last ones of the males, on which the internal genital organs are situated; these two are stronger for support, usually darker colored, and polished. All the others are mostly diaphanous, so that the corda ventralis and its ganglia are visible, sometimes even partly the other organs situated in the abdomen. If the segment mediaire is not counted, there are eight ventral segments. Between the last segments of the abdomen are inserted the anal appendages. They are two-jointed, stout, very hairy, as long as the two last

segments, or shorter (Embia), the apical joint thinner, cylindrical. If asymmetry is present, the left appendage has the basal joint shorter, larger, sometimes almost quadrangular. Between these appendages are situated the external genital organs of the male. They consist of a middle more or less inflated conical or cylindrical membranous part, with a circular opening on tip, representing probably the intromittent organ; on each side is a horny spine, long, narrow, more or less pointed and twisted, asymmetrically in a different manner. The spine of the right side seems to present its regular more or less straight form; the left spine is twisted similar to a corkscrew in its apical half, and so nearly approximates to the intromittent organ that it is clearly to be seen only in alcoholic specimens. In all males, where these characters could be well seen (at least in Oligotoma), more or less asymmetry was evident, and McLachlan, l. c. p. 378, is of the same opinion. The last dorsal segment of the males is also asymmetrical, with a deep impressed fold nearer to the right side, and the apical margin is cut obliquely; the last ventral segment is also asymmetrically protruded. My description of these parts is made only from winged males, but Wood-Mason, l. c. p. 630, says that the larvæ of *O. Saundersii* collected by him in numbers at Jubbulpore, and without the slightest traces of wings, possessed all the same characteristic asymmetry quite apparent, which he considers exclusively confined to the male sex. He adds that "the asymmetry of the tergum of the terminal abdominal somite and of the cerci in *Necrosia maculicollis* (Phasma) appears at the corresponding early stage, and is in nymphs quite as strongly marked as in perfect insects." I am sorry that this insect is not at my disposal, nor can I compare Westwood's Oriental Cabinet. In his catalogue of Orthoptera, Westwood does not mention any asymmetry. I think that the shape of these organs is never expressed in the larvæ in a similar manner as in the imago and in the nympha. Till the contrary is proved, there must remain some doubt if these so-called larvæ do not perhaps belong to a wingless form of the imago.

I have not seen winged females, but in the wingless female, which is said to belong to *O. Michaeli*, and in *Olyntha Mulleri*, no asymmetry is apparent. Not one of the few wingless forms before me considered to be larvæ, is asymmetrical, but those parts are mostly too much shrivelled up in dry specimens to enable one to be certain.

The female opening is at the base of the notched 7th segment, similar to those of the Termitina. The same arrangement of the genitals of the

males among Pseudo-neuroptera is only represented among Perlina and Ephemerina, but without any asymmetry, which appears among the true Orthoptera in Blatina, and after Wood-Mason, also in Phasma.

The Different Forms and Stages.

Of the seventeen species described, three are only known as wingless forms; of the fourteen winged species, not one is known as winged in both sexes. Winged females are known with certainty only in *E. Mauritanica*, and questionably in *E. Persica*. Winged males are known for the first to seventh species of Oligotoma, and probably for *E. Savignyi* and *Olyntha Salvini;* for the three Olyntha, species 13 to 15, the sex is unknown.

Of the three wingless species, one seems to be a female imago; that it belongs to *O. Michaeli*, as Mr. Wood-Mason contends, still needs proof.

The specimen which was described as a nympha, can not belong to this stage, if the description and the figure are correct, as I have stated before. Very probably it is a so-called short-winged form, similar to those known of Termitina, Psocina and Perlina.

The figure of *O. Michaeli* in Gardener's Chronicle, 1876, p. 845, if correct, can only be considered as a nympha; the anterior wing cases are wanting or perhaps aborted. The *O. Müllleri* looks as if it is an imago, with the anterior wing cases aborted and the posterior ones very slightly indicated. It has to be assumed that such forms exist among the Embidina as well as in the Psocina. At least I know of no other reasonable explanation. Concerning the larvæ, or the forms called larvæ, I am perfectly at a loss how to separate them from the winged imago, to which they have been assumed to belong, as about all are of the same size with the imago without any traces of wings. The head of all which I have seen has the characters of a female head. I have stated before that the so-called male larvæ of *O. Saundersii* are somewhat doubtful, and perhaps a wingless state of the male imago. Nevertheless, not having seen them, conjecture may be out of place. The larva of *E. Mauritanica* which transformed in the box, as reported by Mr. Lucas, belonged undoubtedly to that stage. As it must have gone through the nymph stage with wing cases, of which no record is given, an important gap is still to be filled. That there exist larvæ and nymphæ of Embidina is doubtless, but we have to confess that the knowledge of these stages is still a *tabula rasa.*

Habits.

We know only of one single instance in which the winged females of *E. Mauritanica* were found gregarious. The absence of males among them is not without example; among Psocina I have observed at least in three species a very large number close together, all being females. In one flock I secured among hundreds of females, by very careful examination, only one male. I believe the same fact has been recorded of some Hemiptera.

Another isolated observation exists of larvae, and this time all males, being found gregarious on a sandy place among old bricks, by Wood-Mason. Many observers state that *E. Solieri*, discovered in many localities in southern France and Spain, and by no means rare, lives always isolated. The same is recorded of *O. nigra* by Prof. Schaum.

Mr. Lucas was first to observe that the Embidae imago and larva spin silken tunnels. It is doubtless true that the spinning is done with the mouth, as by Psocina (though this has never been observed or stated), as the spinnerets open on the labium. Probably these tunnels induced Mr. Lucas to assume that the Embidina are carnivorous, and to put insects for food in his boxes, but he has not stated that the food was used. The observation by Mr. Michael seems to prove that these insects are phytophagous. Perhaps they are both; at least I may remark that for Grylloталpa the same uncertainty still exists.

Every one asserts that all Embidina are very agile in running and flying. It will be agreed that our actual knowledge concerning their habits is no more satisfactory than that concerning their forms and stages.

Distribution.

There is little more known than has been given by McLachlan, l. c. p. 379. The amber species belonging to the tertiary layers is very rare among amber insects. Compared with Termitina in amber, perhaps one Embia is found for one hundred of the former. The fossil species differs in nothing from the living ones. Whether the species in copal are fossil or not, is still an open question. There are many copal insects which seem to be or are identical with living forms. But large quantities of copal, principally near the coast of East Africa, are dug out of sand or earth, just as amber, and in localities where no copal trees are now to be found. (J. Kirk, Journal Linn. Soc., June, 1868): "At the diggings are

not found any copal trees (Wm. E. Hines, Trans. Amer. Geogr. Soc.), or even any signs of any, and to this time it is a mere conjecture in what ages these deposits of copal were made, probably many thousand years ago." I can not give the exact quotation, as I have before me only a manuscript copy of this paper, written before 1860.* Some insects out of this copal, called in trade Zanzibar copal, but of the Zanzibar copal which was only exported to East India and not to Europe, seem to be identical with insects living in Ceylon. It can therefore not now be assumed that the *Embidina* in copal are still living forms, and that they belong to the fauna of Africa till the identity with living or African insects has been proved.

Considering that only fifteen living species are described by me, it will be seen that I have been purposely as careful as possible in making new species. I could have enumerated six species more, against which with our actual knowledge little objection could have been made. The type of *E. Klugi*, in Paris, must be examined to confirm its identity with *O. Atricapilla*. That of *O. Saundersii* should be compared again with *E. Latreillis*, with the specimens from Borneo and those collected by Wood-Mason, to make their identity certain. The type of *O. Batesii* and *O. Braziliensis*, Burm., should also be compared concerning their identity. The larva from Athens and from Asia Minor could have been given as new species, if it were desirable to describe new species upon such material. Finally the supposition that the large wingless female belongs to *O. Michaeli* needs the support of further careful observation.

Of the fifteen living species described, *O. Saundersii* has by far the largest distribution, Bengal, Borneo, Madagascar, Mauritius and Ascension Islands. *O. Insularis*, from Sandwich Islands, is, perhaps, to be found in Antigua Island. *E. Solieri* is not rare in South France and Spain. The other twelve species are only recorded from one locality. From Bengal, *O. Michaeli;* from Persia, *E. Persica;* from Africa, *E. Savignyi;* from Egypt, *O. Nigra;* and *E. Mauritanica* from Algeria. From America is *O. Cubana*, from Cuba; *O. Hubbardi*, from Florida; *O. Salvini*, from Mexico. From South America, *O. Braziliensis* and *O. Rufica-pilla*, the locality not known; *O. Batesii* from the Amazon; *O. Muelleri*, from Santa Catarina, South Brazil.

*Only two incomplete sets of the transactions are in Boston and Cambridge.

There are thus known from Europe one, perhaps two, species ; from Africa three, and from the islands near to it one more ; from Asia three, perhaps four; from North and Central America, three : from South America, four species ; from the Sandwich Islands, one ; none from Australia. Probably only a small part of the living Embitina is known, and these only in very few specimens, which still form, as they did half a century ago, the gems of the collections. As far as I know, four species are represented by single specimens only, three by two specimens, one by three specimens, two by four, seven by more specimens, but none in a number sufficient to understand the whole history of the insect.

Systematic position and relation.

Prof. Westwood, with his usual sagacity, recognized directly that the three species known to him represented three different forms. So he accepted one large genus, with three sub-genera, which were considered to be genera by Prof. Burmeister, but united again in one large genus by Rambur. McLachlan accepted only two genera, Embia combined with Olyntha and Oligotoma.

The species belonging to Oligotoma are decidedly a very homogeneous group. The only aberrant species, *O. Westwoodi*, differs by a plainer and apparently aborted venation of the wings. Their principal characters are, the more slender form of the body, the small and longer ovoid or obcordate head ; the antennæ as long as head and thorax, or mostly shorter, with fewer (14 to 20) joints ; the narrow prothorax ; the comparatively long legs ; the narrow abdomen, with shorter appendages, and between them protruding the male genitals ; the narrow wings, not longer than the abdomen, with a plain venation, and only one lower branch of the submediana. Asymmetry known only in the male sex. Oligotoma is known from the warm regions of the whole world, and represented in copal and amber. The species belonging to Olyntha form also a homogeneous group. The body is larger and broader; the head is broader, shorter, with antennæ as long as the body, with a third more (to 32) joints ; thorax larger ; the legs more slender ; the abdomen broad, with longer appendages (male genitals not well known) ; the wings are longer than the abdomen, much broader, the venation more complicated by two lower branches of the submediana. The coloration of the species is very uniform. No asymmetry is known. Olyntha is known only from South America and from Central America.

The winged species of Embia are intermediate among Oligotoma and Olyntha. The body is stronger and more flattened above than in Olyntha; the head is shorter, about quadrangular, but the antennæ are as short as in Oligotoma; the prothorax is shorter and broader than in both, but near to the head more narrowed; the thorax is still larger than in Olyntha; the legs are as long and as strong as in Oligotoma; the wings as long as the body (Oligotoma), but broader, with the venation similar to Olyntha; the abdomen is broader and more flat than Olyntha, but with the shorter appendages of Oligotoma. Asymmetry is known only in the female sex. Embia is known only from the old world in the countries around the Mediterranean and Persia.

The knowledge of the three groups is not sufficient to assert that all are only subgenera or genera; in the last case I believe that Olyntha and Embia can not be united.

There can be no doubt that the Embidina belong to a peculiar and well defined family, and cannot be combined with any other family, though a number of characters are found represented in other families.

The body is slender, elongate and flat above; the abdomen representing half the length of the body; the head is free, not inserted, small, flat, quadrangular or ovoid; the eyes are exactly in the front corner of the head, and in the imago state similar to aggregate eyes; ocelli, none; no dividing sutures of the head exist; antennæ as long as the body or half as long, praeocular, moniliform or partly fiiiform, slender and very fragile; mouth parts decidedly of Orthopterous character; maxillary palpi 5 jointed; labium bilobate, the inner lobes transformed into a spinning apparatus, as in Psocina, but with 3 jointed labial palpi, and without the peculiar maxilla of Psocus. Prothroax much narrower than the head, elongate, or as long as broad; always with a dorsal transverse furrow after the anterior third; thorax strong, oblong, the mesothorax longer; each segment of thorax with three dorsal parts, the last one of the metathorax (segment mediaire) like the abdominal segments. Abdomen flat, about equal, with nine transverse oblong dorsal segments and eight ventrals; at the tips on each side a bijointed appendage, short, or as long as the last segments; between them the male genital apparatus, just at the end of the abdomen; the female opening at the base of the seventh ventral segment; the appendages, the male genital apparatus and the last dorsal and ventral segment show, at least in certain forms, asymmetry. Wings not deciduous, narrow, rounded on tips, as long or a little longer

than the abdomen; all four of equal shape, length and venation. The legs are peculiar, the compressed and dilated shape of some parts seem to indicate burrowing legs; they are strong, long, reaching both ends of the body, the middle legs always less strong; the three pairs of legs are equidistant and attached to the ends of the respective segments; the legs of the first and of the middle pair are as distant from the legs of the opposite side as the size of the sternum will allow them to be; but the legs of the hind pair are approximate; coxæ small, stronger on hind legs; femur and tibia about the same length, compressed, inflated; tarsus about as long as tibia, but the basal joint of the first pair as long as tibia, inflated, curvate, with a superior furrow; second joint short; third joint longer, slender with two simple claws.

Systematic Position of the Family.

Savigny, Latreille, V. Audouin, Westwood, Burmeister, Rambur, have placed the Embidina near the Termitina. Westwood, l. c. p. 372, states: "Genus quoad affinitates, Termites cum Ensthenia Westw., inter Perlidas conjungens." I am sorry that he has not given a more detailed proof of this statement. By comparing *Olyntha Braziliensis* with *Eusthenia spectabilis* (both insects figured by himself on the same plate in Griffith pl 72), and by comparing a type specimen of *Eusthenia spectabilis*, kindly presented to me by himself, I confess to being at a loss regarding their affinity. McLachlan, l. c. p. 377, goes even further, not thinking the relationship between Termes and Embia so close as has generally been accepted, and that Westwood happily seized upon its position as between the Termitidae and Perlidae. He says that the external form is not always to be disregarded in searching for affinities, and that Embia has much of the external form of the Perlidae, especially of the genus Leuctra. But he has overlooked that certain species of Termes, for instance, *T. flavipes*, after having lost its wings is just as agile as Embia and very similar to its wingless forms. Some exotic species, as *Stolotermes*, imitate Embia, even in the winged form. Of course, each family belonging to the Pseudo-neuroptera has some characters in common with Embia, but after the knowledge of the internal female organs, which are exceptionally characteristic for the Perlina, we have to dismiss the opinion of a nearer relationship. Indeed, the slender and elongate form of the body excepted, which is found so common in many insects of

different orders, no character is left to bring the Embia nearer to Perla than to Termes. Burmeister, l. c., p. 768, is undoubtedly right in bringing them in a family of its own Embidae, near the Termitina (with whom they had been combined), because they differ from them by all parts of their body.

After a detailed study of the species before me (their number is much larger than the number in the hands of former students), and after due consideration, I believe there is no doubt that Embia is nearer to Termes than to any other family. Concerning the wings, I have given my opinion before in a very detailed manner, that they are not only homologous to the wings of Termes. the basal squama not being developed or aborted, but that the wings by their identical size, shape and venation cannot be compared with those of any other family. The abdomen, except being mostly more ovoid in Termes, is for the segment médiaire and the number of segments homologous; the mouth parts are alike, except the 5-jointed max. palpi; the antennae are similar; the legs are very different, the tarsus 3-jointed. The eyes are in the front corner of the head, while in Termes they are in the hind corner.

The relationship with the Psocina is indicated by the presence of a spinning organ opening on the labium, and by the similar distance of the coxae in some genera. *Embidopsocus* resembles Embia more than Termes, but is in fact a true Psocus, with the habitus of an Embia and with Termit wings. In another paper I may give more about this curious insect.

A comparison with the Odonata and Ephemerina seems not to be needed. Both show an important character of the Embidae, the situation of the eyes in the front corner of the head; the arculus of the Odonata is imitated in the wings of the Embidina.

The statement by Wood-Mason that Embia belongs to the true Orthoptera as a very degraded form—a statement which will probably be proved by him in a later paper—induced me to consider the aberrant forms of this group. The external forms of the curious genus Cylindrodes, have indeed some analogy with the apterous female of *O. Michaeli.* We know very little about Cylindrodes. *C. Campbelli*, from Melville's Island, Australia, was figured in Griffith's Animal Kingd., vol. xv., pl. 131, with details of the mouth parts and legs, and described by R. Gray, Mag. N. H., 1837, vol. i., p. 142, from one imperfect specimen, as belonging near *Gryllotalpa.* Burmeister makes of it a group of *Gryllotalpa*, and Serville a genus following *Gryllotalpa.* Saussure, Mel. Orthopt., 1877,

vol. v., p. 205, brings it in a separate Legion, Cylindrodites, with the only genus, Cylindrodes, and describes and figures, pl. 11, a new species, *C. Kochii*, from Australia, from a rudimentary specimen. None of the authors except Gray have seen this rare insect. Probably it is a female imago; it bores in the stems of plants, committing ravages in greenhouses; it is called by the colonists, wire-worm. The tibia of the anterior legs forms a hand similar to *Gryllotalpa*. What is known about this insect is mainly the general form, which is so different from Embidina that it is barely possible that this degraded family may among the Orthoptera be placed not far from the Embidina.

To try ancestral speculations upon our present insufficient, and for the Embidina, *very scanty knowledge*, would certainly by Darwin himself have been considered illegitimate, if not something worse!

TRAPPING COLEOPTERA.

BY F. B. CAULFIELD, MONTREAL, P. Q.

Wishing to procure a good series of Silphidæ for my collection, about the middle of August I put some scraps of cooked meat into an empty tomato can and hid it under a shrub. I visited it after a few days but found it untouched. I then baited a can with uncooked meat and placed it in a similar situation. I examined it on the 12th of August and took from it the following species :—

Necrophorus orbicollis, 10 specimens.
" *tomentosa (velutina)*, 6 specimens.
Silpha peltata, 20 specimens.
" *marginalis*, 12 specimens. (Of this and the preceding species I could have taken many more).
Silpha inæqualis, 4 specimens.
" *lapponica*, 1 specimen.
" *surinamensis*, 1 specimen.
Staphylinus villosus 1 "

I also took two specimens of a Staphylinus and a number of Histers not yet determined.

On examining the can containing the cooked meat, I was surprised to find in it seven specimens of *Centhophilus maculatus*, as I had not expected to trap Orthoptera.

I visited the traps again on August 15th, but as there had been a heavy thunder storm on the previous day, I met with poor success. The trap which had yielded so abundantly on the 12th, now contained nothing but water, but from the can with cooked bait I took 5 *orbicollis*, 4 *velutina*, 1 *surinamensis*, and 1 *Staphylinus villosus*.

NOTES ON CHRYSOMELA SCALARIS, Lec.

BY F. B. CAULFIELD, MONTREAL, P. Q.

In No. 7 of Entomologica Americana, Mr. G. W. J. Angell gives some interesting notes on this insect. Having examined a large number from various localities "showing a nearly complete gradual gradation from the finely maculate form of *philadelphica*, to the strongly marked *scalaris* type," Mr. Angell is of opinion that *philadelphica* Lin., *multipuncta* Say and its supposed varieties, are all varieties of *scalaris* Lec. I incline myself to the belief that *scalaris* and *philadelphica* are distinct species, and as my experience of these forms appears to be different to that of some other collectors, I give it in the hope that it may lead to a careful study of their life habits. I find that Dr. Harris' history and figure of *scalaris* fit it exactly as it occurs in the neighborhood of Montreal. For years past I have found it on elm and linden, and on no other plant or tree. *Philadelphica* and *Bigsbyana* I find on willow and alder; never on elm and linden. Dr. Packard in his Guide states that *scalaris* is abundant on the alder. This statement puzzled me, as I never yet have found a typical *scalaris* on that shrub. In the Report of the Entomological Society of Ontario for 1882, Mr. W. H. Harrington states that *scalaris* is "found throughout the season on various trees, as elm, the linden, and especially the willows and alders. The same writer states that *philadelphica* feeds on the leaves of the pine. It would thus seem as if these insects varied their food plants in different localities. It is now too late to do anything this season towards settling the question, but next year I trust it will be fully investigated; meanwhile I would like to hear the opinions of other collectors.

HYBERNATION OF FORMICA HERCULEANA, Linn.

BY G. J. BOWLES, MONTREAL, P. Q.

On the 20th October last, when in Brighton, Ont., I went to the woods in search of hybernating insects, and while examining the prostrate trunk of a small pine, found several female specimens of our large black ant, *F. herculeana (ligniperda* Latr.) in their winter quarters. Each ant was in an oval excavation in the wood, just under the bark, about an inch long and half an inch wide and deep. In each cell was found a single ♀ ant, together with from six to fifteen larvæ. On tearing off the bark, about half a dozen cells were exposed, on different and widely separated parts of the trunk. In one or two instances there was a single worker ant with the large ♀. The larvæ were about an eighth of an inch long, and were all alive. They were, in every case, crowded together in a mass, each one in the same position, with the head bent over in front. This observation is, I think, interesting, as it gives a clue to the manner in which colonies of this wood-destroying ant are established. It is probable that the mother ant and the larvæ would survive the winter, and be ready in spring, as soon as the larvæ had become perfect insects, to begin operations from the cell in which they had hybernated. The cells were very neatly excavated, and each seemed to have been entirely the work of the ♀ ant which occupied it, as there was no connection with any other cell, and the surface of the trunk around each was perfectly smooth and uninjured. Nor were there any galleries extending from the cells into the wood of the tree, as I proved by close examination.

NOTES ON ACMAEODERA PULCHELLA, Hbst.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The common species of *Acmaeodera, A. pulchella* Hbst., which is marked with shining bronze-black and bright yellow, assimilates well in color with the flowers of *Rudbeckia hirta* L., so abundant along the edges of cultivated fields, upon which this Buprestid is found. The dark parts of the beetle, which are after an etched pattern, blend well with the rich dark stigmata of the flower, as the beetle lies next to these; while the bright yellow parts easily pass unnoticed in the inside border of the yellow corolla. It is noticeable that these flower-frequenting species are found

chiefly on the flowers whose colors suit them best for protection ; in fact the insects seem to have been modified in color to suit the flowers they live on. This species is seldom found upon any other flowers than those of *Rudbeckia hirta* L. I have once taken it upon the flowers of tansy, once upon a partially yellowed leaf of *Œnothera*, once upon a high dandelion flower, twice upon the orange-red flowers of *Asclepias tuberosa* L., and once flying about some of the many flower-bunches of a clump of sumachs. These are the only exceptions that I have noticed, and are but isolated instances.

The perfect beetles are very abundant here in July ; in my notes I find reference to them only from 3rd to 13th July. It is in the heat of the day that they are to be found upon the upper side of the flowers, probably feeding upon the pollen ; toward evening, and in cloudy weather, as well as sometimes in sunny weather, they are to be found on the under side of the flowers, clinging to the sepals or petals, where they doubtless spend the night. Thus these flowers furnish the perfect beetles with food and home ; and probably their larvæ bore the very stalks which support the flowers. The beetles seem to avoid generally the large patches, frequenting isolated clumps with only a few flowers, or single flowers. On one isolated flower I have taken five or more, mostly large specimens, while the same day (8th July, 1883) I went through large patches of the flowers without taking one, or only a few scattered ones.

CORRESPONDENCE.

ON WILLOW AS FOOD-PLANT OF PAPILIO TURNUS.

Dear Sir : As stated on page 140, willow is given in "Butterflies," p. 309. I asked Mr. Scudder for his authority, and he replies, "Gosse, in Canadian Naturalist." On page 293 of this book, London, 1840, I read : "I have taken it" (the caterpillar) "from willow, poplar," &c. So far as I know, in the 45 years since that line was printed, willow has not been noticed as one of the food-plants of *Turnus*. I asked Mr. John Akhurst, who has bred *Turnus* as often as any one living, if he had ever found the larva on willow. He says he never has, and enumerates a great number of other trees on which he has found it. I should like much to know if any of the readers of this magazine have ever found this larva on willow, or of their own knowledge can say that this is one of its food-plants.

W. H. EDWARDS, Coalburgh, W. Va.

The Canadian Entomologist.

VOL. XVII. LONDON, DECEMBER, 1885. No. 12

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Entomological Society was held in London at the Society's rooms, Victoria Hall, on Tuesday, October 13, 1885, at 8 o'clock p. m.

The President, Mr. Wm. Saunders, of London, Ont., in the chair.

Present—Mr. James Fletcher, Ottawa; Mr. T. Alston Moffat, Hamilton; Rev. C. J. S. Bethune, Port Hope; Mr. W. H. Harrington, Ottawa; Capt. Gamble Geddes, Toronto; Rev. F. W. Fyles, South Quebec; Mr. J. G. Bowles, Montreal; Mr. J. M. Denton, Mr. H. P. Bock, Mr. Lawrence Reed, of London; Messrs. Weld and Macdonald, of the *Farmer's Advocate*, London, and the Secretary-Treasurer, Mr. E. Baynes Reed.

The minutes of the former meeting were read and confirmed.

The President gave a cordial welcome to the visiting members and expressed the pleasure of the London members at meeting so many of their friends.

The Report of the Council, the Financial Report of the Secretary-Treasurer, and the Report of the Librarian for the past year, were then submitted to the meeting, and on motion duly received, discussed and adopted.

These Reports will appear as usual in the Annual Report.

The President stated that owing to unforseen circumstances no delegate had been sent to the last meeting of the American Association for the Advancement of Science held at Ann Arbor, Michigan, but that a summary of the business transacted by the Entomological Club had been kindly forwarded by the Secretary, and would be published in the CANADIAN ENTOMOLOGIST.

The Report of the Montreal Branch was read, and after an expression of gratification by members present at the prosperous condition of the Branch, the Report was received and ordered to be printed as usual.

REPORT OF DELEGATE TO ROYAL SOCIETY OF CANADA.

Mr. W. H. Harrington presented his Report read at the meeting of the Royal Society, as follows :

As delegate from the Entomological Society of Ontario, it affords me much pleasure to announce that the Society has continued to make satisfactory progress, both in membership and in the work which it undertakes.

The monthly publication of the "Entomologist" brings before students of insects, both in this country and abroad, very valuable and interesting papers on the habits and life-histories of our species, with frequent descriptions of new species discovered in our extensive country. Volume xvi. has been completed, and several valuable parts of xvii. have been already issued.

The "Annual Report," No. xiv., issued by the Society, contains several instructive papers prepared especially for agriculturists, and well supplied with such illustrations as may enable them to recognize the insects therein described.

The Montreal Branch of the Society is in a flourishing condition, which is due to the exertions of the energetic and enthusiastic Entomologists who reside in that city.

Gratification is felt at the evidence of a growing interest in regard to the very important question of the serious losses annually caused throughout the country by the depredations of various insects.

The Select Committee appointed by Parliament in 1884 to obtain information as to the agricultural interests of the Dominion, issued circulars to a large number of leading fruit-growers and other agriculturists throughout the country, requesting, among other points, an expression of opinion as to the desirability of the appointment of a Government Entomologist. A large majority of the answers were in favor of such an appointment.

Two members of the Council of the Entomological Society were also called, and gave evidence before the Committee as to the ravages of insects in Canada, and as to the advantages which would result from the appointment of a competent Entomologist.

The Department of Agriculture, impressed by the importance of the subject as thus brought before its notice,has since appointed as Entomologist one of the most energetic officers and workers of our Society—Mr. James Fletcher—who has issued a Preliminary Report, briefly describing

the most noticeable injuries caused by insects last season to the various crops.

In the United States great attention is still paid to the study of Economic Entomology. Several of the States, as well as the Federal Government,make liberal provisions for the investigations of appointed Entomologists.

The published Reports of such investigations are exceedingly valuable ; and furnish, with the exception of that supplied by the Entomological Society of Ontario, almost the only reliable information regarding the injurious insects infesting our orchards, fields and gardens.

It is a matter of no little importance that as full information as can be obtained should be, as widely as possible, circulated among our farmers, and to this end the appointment of an Entomologist by the Department of Agriculture is an important step in the right direction.

The President then delivered his annual address.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Gentlemen,—The season of 1885 has not been distinguished by any unusual invasion by injurious insect hosts. Nothing assuming the proportion of a general or serious calamity in this direction has occurred in any department of agriculture or horticulture ; nevertheless instances have not been wanting where local injuries caused by insects have assumed considerable proportions, the sum total of which, if the results were expressed in money loss, would represent a very large sum.

The great staple productions of our country, such as wheat, oats, barley and hay, have not, so far as we have been able to learn, suffered material injury from insects in any locality in our Province, but while the farmers of Ontario have thus been exempt, our neighbors across the lines have not enjoyed the same immunity. In the neighbouring State of New York the loss occasioned by the Hessian Fly has been estimated at over $100,000. In the great wheat fields on the Pacific slope, and also in those of Dacotah and other Western States, there have been much severer losses from the same cause. Early in August I received from a correspondent in Dallas, Oregon, samples of wheat seriously injured by another destructive insect which as yet, happily, has not to our knowledge occurred in Canada. This is a small yellowish worm from one-sixth to one-fifth of an inch in length, which is found within the stalk of wheat about

or between the joints; sometimes there are four or five larvæ in a single stalk, one above each joint for the first four or five joints from the ground, which cause the stalk to prematurely ripen or to wither, and thus occasion great loss. This insect, which is known as the "Wheat Isosoma," *Isosoma tritici*, Riley, has been observed for two or three years past, injuring the wheat in Illinois, Tennessee and Missouri, and has prevailed in some localities to such an extent as to ruin the crop. From the observations thus far made it seems that there is only one brood of this insect during the season, and that it passes the winter in the straw either in the larval or pupal state, the perfect flies appearing the following spring. Under these conditions the remedy is obvious, viz., burn both the stubble and the straw after harvest; rotation of crops has also been found beneficial.

The cabbage crop has been materially injured by the ravages of the cabbage Anthomyia, *Anthomyia brassicæ*, a two-winged fly which in the larval state burrows in the stem of the young plant and causes its death. This cabbage insect is a native of Europe, is very troublesome in Britain and has been known as a destructive insect in this country for about thirty years, but nothing is known either of the date or the method of its introduction. The flies appear in the spring and deposit their eggs upon the stems of the young cabbages, about or a little below the surface of the ground. The eggs hatch in about ten days, when the young larvæ usually bore into the interior and work their way down towards the root; sometimes they merely gnaw grooves on the outer surface of the stem, and by this means find their way to the roots on which they feed. When full grown they change to yellowish red chrysalids in the earth, from which the flies shortly escape, the whole period of their life history thus briefly traced occupying about eight weeks. Usually the plants attacked soon wilt and finally die. It is believed that there are two or three broods of these insects during the year.

Several remedies have been recommended, such as dipping the roots and stems of the young plants in strong lye, or a mixture of earth and cowdung diluted with water, or a thick mixture of soot and water. Any bitter or alkaline substance which would adhere well to the outer surface would probably deter the flies from depositing their eggs. Lime added to the soil in the proportion of 100 to 150 bushels to the acre, after ploughing, and well harrowed in so as to keep it near the surface, has proved a very effectual preventive measure, or even where the insects are

at work on the plants, if the earth is scraped away from about the stem of each and a handful of lime dusted around it and the soil again drawn up to the stem, the plants will sometimes recover. Coal-dust, gas-lime and stimulating artificial manures have also been recommended.

The cabbage has also suffered from injuries caused by the common cabbage worm, the green caterpillar of the cabbage butterfly which feeds upon the foliage, and often disfigures it to such an extent as to render it unmarketable. The habit of this caterpillar, feeding as it does among the folds of the leaves, makes it extremely difficult to reach with any sort of poison without at the same time rendering the cabbage unfit for use. Pyrethrum or insect powder, which is the powdered flowers of *Pyrethrum cinnerariaefolium*, has been used with good effect, either dusted on the plants, or mixed with water and applied to them with a syringe, and this remedy is not in any way objectionable or poisonous. The Pyrethrum plant is in my experience quite hardy in Ontario, has stood the severe cold of the past two winters without injury, and flowered freely. It is easily raised from seed, and being a perennial species, when once established it will continue to flower for an indefinite number of years. The flowers, collected when just about to expand, dried and powdered, are very efficient as a general insecticide.

During the past year or two many interesting experiments have been made and valuable results obtained, in the way of artificially introducing disease among communities of caterpillars, a sort of caterpillar plague or pestilence which carries them off by thousands. There is a very fatal disease which appears from time to time among silk worms, the larvæ of *Bombyx mori* when bred for the production of silk, a disease which spreads so rapidly that it frequently destroys entire broods of caterpillars within a few days. So destructive has it been that it is estimated that the silk crop in Europe is damaged by it to the extent of many millions of dollars annually. During the past ten years it is believed to have reduced the income of silk breeders some twenty-five per cent., and in 1879 was said to be the main cause in the great falling off in the silk crop of that year, which was only about one-fourth of the amount ordinarily produced. The celebrated Pasteur investigated this disease, and found it to proceed from the presence of an exceedingly minute form of bacteria, so excessively small that it has been estimated that it would require eight millions of them to cover the head of an ordinary pin. When water containing these minute organisms is sprinkled on the leaves on which the silk worms are

fed, they are found to be rapidly infected and capable of communicating this pestilential disease to others with which they are associated. The bacteria may be preserved in a torpid condition without loss of effectiveness for at least a year, probably for several years, and that without any particular care, and when required for use can be rapidly propagated in a suitable fluid.

In my address to you last year I referred to a similar form of disease which had occurred among cut-worms so abundant in clover fields in the Ottawa district, and in 1878 and 1879 to a similar trouble among the forest tent caterpillars at that time so abundant. Now I am glad to be able to report a similar disease among the cabbage worms,and to indicate to you some practical results arising from investigations regarding its nature and mode of operation.

Throughout most of the State of Illinois and in some parts of Michigan, it was observed last autumn that a large proportion of the cabbage worms sickened and died. Hundreds of their bodies were to be seen rotting on the cabbage leaves or shrunken and dried to a blackened fragment. This was soon brought under the notice of the State Entomologist of Illinois, Prof. S. A. Forbes, a most careful and indefatigable observer, who at once proceeded to investigate the cause of this caterpillar plague. He found the disease at first to be very unevenly distributed, some isolated fields showing no trace of it, while others not far distant were fairly reeking with death and decay, but as the season advanced it spread in every direction until in some districts almost every worm perished. He says, "We can conceive something of the significance of this disease if we imagine the terror and dread which would seize mankind if such a plague should sud denly assail human life. Whole towns would be depopulated and the dead would rot in the streets by hundreds. There would be no escape for any, because the contagion would be conveyed by the very food and drink by which life was sustained."

By dissecting specimens of the dead caterpillars, the microscope showed their intestines to be full of undigested food and swarming with a species of micrococcus, which appeared in the form of excessively minute spheres about one twenty-five thousandth of an inch in diameter, sometimes single, sometimes in pairs, and occasionally in strings of from four to eight. He found that these minute organisms could be readily cultivated in beef broth, and that a single drop of fluid from a diseased worm introduced into a vessel of such broth, would in two or three days render the

whole contents milky with myriads upon myriads of these microscopic organisms precisely the same as those taken from the diseased larvæ. He also found by experiment that the disease could be communicated to other species of caterpillars. Experiments continued during the present year have shown that by propagating this form of bacteria in the manner described, and mixing a pint of a well-charged culture with a barrel of water and syringing cabbages with this fluid, the disease may be introduced,thus furnishing us with another means of defence against some of these injurious insects.

A new strawberry insect has appeared in our midst which is deserving of notice. In the latter part of June last public attention was called to this subject by some paragraphs which appeared in the newspapers. The depredations of the insect were first observed in Staten Island, New York, causing grave apprehensions among the strawberry growers there; it appeared also about the same time in some parts of Michigan. The Entomological Bureau of the Department of Agriculture in Washington promptly took steps to investigate the subject, and the Chief of the Bureau, Prof. C. V. Riley, proceeded in person to enquire into the character and extent of the injury,with the view of suggesting measures for its abatement. The results of this work have not yet reached us, beyond some brief notices which appeared in the press, in which the nature of the injury was stated and the name of the insect given. This new pest was found to be a small curculio which has been known to Entomologists in this country for more than fifty years under the name of *Authonomus musculus*. It is a small snout beetle which measures, including the beak or snout, only one-tenth of an inch. The body is of a dull reddish colour, punctured, and dotted and spotted with white; different specimens vary much in their general hue, some being found very dark, occasionally almost black. Heretofore it has been met with only in the collections of Entomologists, who have found it to be very generally destributed throughout the Middle, Southern and Western States, and also in Canada, but nowhere in any particular abundance, and no one had thus far suspected it to be guilty of any injurious propensities; indeed, little or nothing has been known of its habits or history. A few days after its appearance in this new role—as a strawberry pest—was announced in the United States, I received a package from Mr. J. C. Morgan, an energetic strawberry grower in Barrie, Ontario, intimating that a destructive insect which had never been noticed before was seriously injuring some of the strawberry beds in that neighbourhood, an

insect which seemed to have a special liking for that variety of strawberry known as the Sharpless. When speaking of this pest Mr. Morgan says: "It climbs up the flower stalk, selects one flower, and deliberately and quickly cuts it off; as soon as the flower falls or hangs over by a small thread, the insect crawls down, runs up the next stalk and commences again. This performance is varied by puncturing the open blossom in several places, which said blossom will also come to grief. It is found in immense numbers on the Sharpless, slightly on the Wilson, and on no other berry as yet." On examination this was determined to be the same species as that which had occurred on Staten Island and in Michigan. It is remarkable that this insect never met with before in any great number, should have occurred in such abundance at points so distant from each other as Staten Island, N. Y., Michigan, and Barrie, Ontario, all about the same time, and not be reported as occurring at intermediate points. In the absence of further knowledge of the life history of this insect, we can only suggest as a remedy the use of Paris green and water in the proportion of a teaspoonful of the poison to two gallons of water, which if applied to the vines with a syringe when the beetles are troublesome, would probably destroy many of them.

Further complaints reached us during the early summer months of injury done to the blossoms of the grape by the Rose Beetle, *Macrodactylus subspinosus*. I can only repeat what has been already several times stated, that this pest may be much lessened, if not entirely got rid of, by jarring the vines early in the morning while the beetles are in a semi-torpid state and collecting them on sheets and destroying them.

The pea crop has for the past year or two been unusually free from the Pea-bug, *Bruchus pisi*. Now that the life history of this insect is so well known, farmers are more careful in selecting the seed, while seed dealers by special treatment are enabled to destroy the insects in the peas before offering them for sale. The gratifying immunity from this pest and the large saving thereby effected, is doubtless to be attributed mainly to greater care in these particulars.

In the address presented to you in 1880, I offered some remarks on the relations existing between birds and insects, and expressed the opinion that while the soft-billed insectivorous birds are exceedingly useful, that birds in general are not of such great use in subduing injurious insects as is commonly supposed, and that destructive insects are controlled to a far greater extent by their insect enemies and by the diseases to which

they are subject. Experience since gained has confirmed this opinion. During the period which has elapsed much discussion has taken place regarding the English sparrow, which has now increased to a considerable extent in many of our towns and cities, and occasional flocks of them find their way into the country. While this fearless little bird has had many advocates, the weight of evidence is undoubtedly against it, and it now stands convicted on several counts: of destructive propensities from the grain it destroys and devours and the injury it does to fruit trees by eating the buds; of pugnacity, which results in its driving away other and more useful native birds, while on the other hand the good it does in the way of consuming injurious insects, as proven by the examination of the crops of many of them, is comparatively small. The question is often asked by the friends of the sparrow, when the merits of this little emigrant are under consideration: "How is it that we hear no complaints of its depredations in England, where it has so long been a common bird?" Frequent complaints are made in England regarding it, and measures urged for its destruction. In recent reports issued there, especially those published by that well known and talented authoress, Miss E. Ormerod, we find serious charges recorded. One writer states that the sparrow has greatly increased in England during the past ten years, that large flocks of them sweep down on the wheat fields, devouring and destroying a considerable proportion of the grain. It is estimated that one million pounds sterling would not repay the farmers of England for the yearly loss sustained through the depredations of this quarrelsome pest. Besides the direct injury thus occasioned, it is said that sparrows prevent the increase of swallows, and drive the soft-billed insect-eating birds, which feed largely on the eggs and larvæ of insects, from the gardens and orchards, while they seldom eat a caterpillar. Another bears evidence of having seen a field of wheat so utterly ruined by legions of sparrows that it was left uncut; many other similar instances are cited. It is highly probable that we shall in the near future have many occasions to regret that this bird was ever introduced into Canada.

During the past year some interesting facts have been published bearing on the retarding influences of cold on the development of insects, as seen in the arctic regions. These observations have extended over several years, and show that butterflies which in the warmer regions of the earth pass through all their transformations once or more in a season, take two or three years to complete a single cycle where the summer season is very short and the prevailing temperature low.

Besides the report of our own Society, which contained much useful and practical information, there has been issued in Canada since I last addressed you a preliminary report by the Dominion Entomologist, Mr. Jas. Fletcher, containing some useful records of work done during the year and plans for more extended usefulness in the future. It is cause for sincere regret that our esteemed fellow-laborer has in consequence of a severe affliction been obliged to postpone the completion of some of his cherished plans, and thus the completion of work begun with much vigor and promise has been unavoidably delayed. We sincerely hope that he may soon be entirely restored, and thus be enabled to carry on with increased efficiency the work he has undertaken. In addition to the excellent annual report of Miss Ormerod, which has already been noticed, there has been issued in England a useful pamphlet on "Insects Injurious to Hop Plants," prepared for the Agricultural Department of Great Britain by Chas. Whitehead. This issue is to be followed by others on grain, root and fruit crops, and it is sincerely hoped that the issue of these publications will awaken in the minds of the agriculturists of Great Britain a livelier interest in the importance of the study of economic entomology. In the United States much has been done. The Entomological Bureau in Washington, under the able direction of Prof. Riley, has most efficiently continued its good work by investigating insect pests in all parts of the United States, and in endeavoring to devise useful measures for their destruction. The reports issued during the past year have been most valuable, and are profusely illustrated. The annual report of Prof. Forbes, State Entomologist of Illinois, is also especially worthy of notice. Very excellent papers on economic entomology have also been published by Prof. J. A. Lintner, State Entomologist of New York, Prof. A. J. Cook, of Lansing, Michigan, Prof. Herbert Osborn, of Ames, Iowa, and others.

Mr. Wm. H. Edwards, of Coalburgh, W. Va., has published a revised catalogue of the Diurnal Lepidoptera North of Mexico, and has continued the publication in parts of his magnificent work on the Butterflies of North America. He has also continued his observations on the life histories of American butterflies, the results of which have been published in the monthly organ of our Society, the CANADIAN ENTOMOLOGIST. A new list of Coleoptera of America North of Mexico, by Samuel Henshaw, has also appeared.

Some indication is given of the progress being made in the study of Entomology in any community, by the extent of information recorded in

reference to the Diurnal Lepidoptera found in such district. If such an indication may be taken as reliable, we in Canada have made much progress within the past few years. Twenty years ago when our Society published its first list of Canadian butterflies, the number of species then known was 66; now our lists contain no less than 210. For a large proportion of this great increase we are indebted to the labors of Mr. G. Geddes in the Rocky Mountains and North-west Territories, and to those of Mr. James Fletcher in British Columbia. These gentlemen have been indefatigable in their work, and at the same time most successful. While there may not now be many more laurels to gain among the Diurnal Lepidoptera, there are other inviting departments of labor in which any industrious Entomologist may add much to our present knowledge. We are glad to know that Mr. W. H. Harrington is making good progress in the collection and study of our Hymenoptera; we hope that some of our members will be induced to undertake in a similar way our Diptera, Neuroptera, Hemiptera and Orthoptera, so that we may soon be able to form some idea of the richness of our territory in these long neglected orders. WM. SAUNDERS.

ELECTION OF OFFICERS.

The following named gentlemen were then duly elected as officers of the Society for the ensuing year: President, William Saunders, London, Ont.; Vice-President, Rev. C. J. S. Bethune, M. A., Port Hope, Ont.; Sec.-Treas. and Librarian, E. Baynes Reed, London, Ont.; Council—J. Fletcher, Ottawa; Rev. T. W. Fyles, Quebec; J. A. Moffat, Hamilton; W. H. Harrington, Ottawa, and G. J. Bowles, Montreal. Editor CANADIAN ENTOMOLOGIST, Wm. Saunders; Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, Jas. Fletcher, and E. Baynes Reed. Auditors—W. E. Saunders, H. P. Bock; Delegate to Royal Society—W. H. Harrington.

LARVÆ OF HEMILEUCA MAIA, DRU.

BY CHAS. F. GOODHUE, WEBSTER, N. H.

It was my good fortune, in May last, to find a brood of the larvæ of this species. As they were very different from the only description we have seen, i. e., that of Morris in his Synopsis, we herewith give a description of three of its stages. As all the stages were not observed we will begin with the last, as it will by that means be more short. Mature larvæ, 1.50

to 1.75 inches long, color black, thickly dotted with yellowish white. Head slightly triangular, smooth and shining. Head, top of segment next to it, feet and vent, rich reddish brown.

On segments 2, 3, 4, 5, 6 and 11 are eight rather long branching black spines. Segments 7, 8, 9 and 10 have six, and segments 12 and 13, seven. The two dorsal spines on segments 3 to 11 and one on 12 are surrounded at the base with a spreading tuft of yellowish bristles. Preceding stage like the last, only there are no yellowish dots on the body. The next before this, and the first stage observed, the larvæ are entirely black; no yellowish bristles round base of dorsal spines as in the two last stages.

The larvæ were somewhat different in color for a few hours directly after the last moult, from what they were afterwards, being lighter in color, but they were all alike, and like the description given in twelve hours after moult.

July 9 they went under a few loose leaves on the bottom of the feeding box and made a cell in the debris without spinning any silk.

Four days after some of them had changed to pupæ, and in seven or eight all had changed.

The pupæ are .75 to .85 inch long, dark brown, head case smooth and rounded; the joints of the abdomen are close, making the pupæ rather rigid. The pupæ closely resemble those of *Hyperchiria Io*, but smaller and a trifle more slender.

The moths came out the middle of Sept.

The larvæ were found on common meadow sweet *(Spiræa salicifolia)* and were reared on it. We have always thought that the food plant would prove to be something besides oak, from the habits of the moth, it being almost invariably found on low, wet meadow land, oftentimes at a long distance from oaks of any kind. Willow is also given as one of its food plants.

The larvæ are gregarious, many feeding on a single twig, and when at rest are closely packed together, much resembling the larvæ of *Vanessa antiopa* in this respect, as they also do in looks.

The moth is usually common in this locality during the last of Sept., when it may be found on the wing in the middle of the day, coursing back and forth over the low lands.

The males are usually in excess of the females, thirty to one, and it is uncommon to get a perfect female, they nearly always being torn and ragged.

DESCRIPTION OF THE PREPARATORY STAGES OF PHOLISORA CATULLUS, Fabricius.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Conical, the base flat, the top truncated, rounded, and divided from centre outward into eight or nine rounded, nearly equal, smooth lobes; at the micropyle a deep depression; sides marked by about 15 vertical ribs, low, rounded; the spaces between the ribs a little excavated, and crossed horizontally by many fine striæ; color pale yellow-brown, or luteous. Duration of this stage about five days.

YOUNG LARVÆ.—At 12 hours from egg, length .04 inch; slender, the middle segments somewhat thickest; color green-orange, under side green-yellow, as are the feet and legs; segment 2 is whitish, with a black chitinous dorsal collar in front; head sub-globose, black-brown, shining. Duration of this stage three days.

After first moult:—Length, at 12 hours, .12 inch; shape as before; color yellow-green, thickly covered with minute yellow points, each of which gives out a short fine whitish hair; the collar on 2 black; head sub-cordate, roughened, black-brown, with a covering of fine down. Duration of this stage three days.

After second moult:—Length, at 12 hours, .16 inch; shape as before; color same; head as before. To next moult three days.

After third moult:—Length, at 24 hours, .42 inch; stout, of nearly even thickness from 4 to 12; color yellow-green, with tubercles and hairs as in previous stages; head as before. To next moult two or three days.

After fourth moult:—At 12 hours, length .6 inch. Three days later,

MATURE LARVA.—Length .7 inch, greatest breadth .16 inch; obese, a little thickest in middle segments, but very stout from 4 to 12; color yellow-green, thickly covered with fine flattened tuberculations, of irregular sizes, whitish, each giving out a fine short white hair, whereby the surface is downy; a faint sub-dorsal yellow stripe on either side; under side, feet and legs, more green; segment 2 has a narrow black chitinous dorsal collar, cleft at summit; rest of 2 whitish; head sub-cordate, rough, black-brown, covered with fine down as the body. From fourth moult to chrysalis seven days.

Some larvæ in last stage have no trace of the sub-dorsal stripes; and in some the color is brownish-green.

Chrysalis.—Length .52 inch, greatest breadth .14 inch; cylindrical,

slender, thickest in middle and tapering slightly to head; the head case compressed on dorsal side, so that there is an even slope from top of mesonotum to the end; this last is rounded, and at either end of the curve the ocellar prominence is set, also rounded, and not projecting so far as the top of the curve; all this part thickly beset with short bristles; the mesonotum round and scarcely elevated, color greenish-yellow, or greenish-brown, according to the color of the larva, covered with a whitish mealy dust; on either side of dorsum, at base of head case, is a small round black process, surmounted by a circle of short bristles. Duration of this stage when the imago comes forth the same season, about seven days. From laying of egg to imago about thirty days.

This pretty species flies quite generally throughout the United States to Pacific, and Mexico; also in the southern part of British America. Abbot says it is to be found about gardens and fields, and among melon blossoms. It is somewhat abundant in some years in my own garden, and I have observed it often about melon and cucumber patches, alighting on the leaves. Probably its fondness for gardens is because its larval food plant, pig-weed (Ambrosia) abounds in such places. I know of no other food plant, but Abbot gives horse-mint, Monarda punctata, Origanum, Chenopodium, which he calls lamb's quarters, and another plant called "careless," but which neither Wood nor Gray help to identify. The egg is laid singly on the upper side of a leaf, sometimes near the edge, but generally near to the mid-rib. It is of a peculiar shape, quite different from that of any species of Nisoniades which I have seen, and reminds one of a confectioner's cake-mould, or of an inverted basket made of fine willow twigs. The color, too, is peculiar, as compared with other Hesperian eggs, which are usually white or yellow-white when laid, being red-brown, and looking on the leaf like a speck of dust. I have often found several eggs on a stunted plant not more than two or three inches high growing on the gravel walk.

The young larva goes to edge of its leaf, cuts in about one tenth inch, and folds over a corner so separated, binding it down by two or three threads. Here it lies concealed till the first moult has passed, and feeds on the fleshy part of the leaf within the fold. After first moult the larva draws the leaf together by the edges, and from second moult on the hiding place is readily distinguished by the oval swelling of the leaf. When about to moult the case is thickly lined with silk, and closed at every point. The larvæ come outside to feed and return to their cases, and

feeding takes place at night. Some of my examples were kept in tin boxes, and on one occasion I surprised one of the larvæ feeding at a distance from its case; at another, one was close to the opening and hastily retreated into the case, tail foremost, as I opened the box. They are perfectly neat in their cases, the frass being always expelled or voided outside. At any time after the first stage and to maturity, on slitting a case, the larva will be found lying with anterior segments bent round so that the head comes a little beyond middle of body, and in nearly every instance I have found the tail towards the closed end of the case.

There seem to be two broods of the imago in West Virginia, flying in June and August. The larvæ found in September have hibernated, to pupate in the spring, but larvæ of summer produced butterflies the same season. The larva is full-grown when hibernation takes place, and after awaking, pupates almost immediately, that is, after 2 or 3 days. This habit is like that of species of Nisoniades observed. Abbot, Ins. Ga., says that a larva of *Catullus* which pupated 18th June gave butterfly the 26th; another which pupated 29th July gave butterfly 5th August; and one which "enclosed itself 14th Sept., gave butterfly middle of March." By this I conclude there are three broods of the imago in the Gulf States.

I have, as I write, 13th Sept., 1885, two larvæ in hibernation, one of them under a leaf on a bit of paper. The leaf is moulded to an oval, rather a half oval, cut lengthwise, the edges flattened all round, and everywhere bound to the paper by close web, so that quite an effort is required on my part to raise the edge in the least. The other caterpillar lies under a small, oblong slip of paper upon a larger piece which at one end is bent considerably. At that end the opening between the two is a half circle. This is closed by a sort of lace work, full of small openings, and the web first spun is strengthened by several stout threads which lie upon it and cross in various ways. This sort of drum-head covering would resist a strong attack of any enemy but a bird or mouse. The other three sides of the slip of paper are held down by stout threads or cords each of very many fibres, having their attachments upon bases of web thickly spread upon the under paper and at the edges of the upper one. How these threads are brought together at the middle into such a cord is not apparent, but they seem to be laid side by side and cemented In color these cords are black, while the web itself is pale brown. One cord holds the end of the slip, two hold one side, one of them near either end, and three hold the other side. In addition to this the three sides

have web woven all around within. This is the sort of foresight these larvae exercise in providing for hibernation.

Except the brief account of Abbot above referred to, I have found nothing relating to the history of *Catullus*. Mr. Scudder, in Butterflies, p. 9, fig. 14, gives a cut of the egg, which is not a good one, from an example distorted perhaps by alcohol. Instead of rounded lobes at top, this part is made up of illy-defined points, and the sides are not symmetrical. Abbot figures the mature larva pretty well, the head excepted, which is out of drawing, and discovers three whitish points on front face. In nature these spots have no existence. The chrysalis is better. So far as I am aware, this is all relating to *Catullus* hitherto published.

PREPARATORY STAGES OF ICHTHYURA ORNATA.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter .035 of an inch, about the same in height; blunt, conical, the base flat; smooth; white, a dull red band round each a little below the middle, which is pretty well defined on its lower edge, but the upper is irregular, sometimes a small red speck on the apex. Duration of this period 10 days.

Young Larva.—Length .08 of an inch. General color grayish white, a purplish red band across each of the following joints, 2, 5, 7 and 12, with a faint row of the same along each side. Head jet black, broader than the body; joint 12 a little elevated; thoracic feet black, the others concolorous with the body; the body sparsely covered with white hairs half the length of the larva. Duration of this period from 2 to 3 days.

After the first moult.—Length, .15 of an inch; color much as before, the red on joints 5 and 7 broader, the latter a little faint, the lateral stripes more distinct, three faint stripes on the dorsum; all these stripes of the same color as in first stage. Duration of this period, 6 days.

After the second moult.—Length, .25 of an inch. Of the same general appearance as before, but some change in color. Head, jet black. Dorsum yellow, slightly green tinted, containing three fine reddish purple stripes; joints 5 and 12 slightly elevated and reddish purple, as also the anal extremity and a narrow shield on joint 2. On the sides above the stigmata a broad reddish purple band; below this the color is yellow, not so bright as on the dorsum, mottled with purple, the purple hardly in lines

except above the feet; thoracic feet black, the others light. Duration of this period, 4 days.

After the third moult.—Length, .35 of an inch. Of the same general character as during the preceding stage; the dorsum yellow, with three reddish purple lines, but the piliferous spots on all the joints but 5 and 12 are more prominent and brighter yellow; the lateral stripe purple as before, but on some examples it contains a darker central line, below this a row of yellow piliferous spots, the area below these yellowish and striped by about three broken lines. Joints 5 and 12 have each a transverse band of purple and a row of black piliferous spots, slightly elevated. Venter and anal part, translucent whitish; head, brown; hairs, white. Duration of this period, 7 days.

After the fourth moult.—Length, .65 of an inch, but few changes from the preceding period. Marked as before, but more robust; the broad lateral stripe pale and composed of mottlings of red, brownish tinged, on a whitish ground, the thin dorsal lines the same; piliferous spots yellow; head paler than in preceding period.

Mature Larva.—Length, when at rest, from .85 to .90 inch; nearly cylindrical, a little enlarged through joint 5; head, .12 inch in diameter; joint 5, .15 inch. In color an almost uniform mottled reddish brown and whitish, the latter in irregular annulations to the brown patches; a dorsal line, and one on each side of it, a little more distinct brown. In some examples the brown is slightly greenish tinted, and the white is more extensive, giving the body a slight gray tint. Piliferous spots, yellow; head, light brown, mottled so that the anterior parts of the cheeks are darker brown; legs concolorous with the body; stigmata black. Duration of this period, 5 days.

Chrysalis.—Length, .55 of an inch; depth of thorax, .16 inch; of abdominal joints 3 to 5, .20 inch, from which it tapers gradually back; cylindrical, slightly depressed on dorsum of joints 1 and 2; abdomen blunt, conical; wing, tongue and leg cases extending to a little back of the middle of joint 5; the anterior part of the abdominal joints slightly punctured; the rest of surface smooth except corrugations on the wing cases. Color, chestnut brown, the wing cases darker, eyes dark brown. Duration of this period from 8 to 10 days.

The eggs that furnished the larvæ for the preparatory stages given here were sent me from Truckee, Cal., by Mr. C. F. McGlashan, June 15, 1885, the eggs having been deposited June 9th. This gives us from 43 to

45 days from the egg to the imago, a period about the same here as *Palla*. I am inclined to think, however, that in its home in the Sierras its growth is not so rapid, probably requiring a longer time for development, and finally passing the winter in the chrysalis state instead of producing the imago as it did here. A part of this is conjecture, however, for though I learned from Mr. McGlashan's letters that his chrysalids had not hatched some time after mine had, I do not know but they may have done so since. With us the species would be double brooded the same as *Palla*, the last chrysalids hibernating.

Like *Palla*, the food plant is willow. As soon as hatched the larvæ begin to fasten leaves together with silk, forming a retreat or vivarium within which they live together. When at rest the anterior part of the body is bent to one side. This was noticed more after the second moult than before, but continued through the larval stage. During the early periods they ate the parenchyma of the leaves, leaving the framework. When ready to spin their cocoons some leaves were fastened together, and inside this was spun the cocoon that did not differ materially from other species.

BRITISH COLUMBIAN HYMENOPTERA.

BY GEO. W. TAYLOR, VICTORIA, B. C.

In the June number of the CANADIAN ENTOMOLOGIST, p. 114, there is a paper by M. L'Abbe Provancher, containing descriptions of a new genus, *Platysoma*, and 7 new species of Canadian Hymenoptera. Six of these new species, *Ich. Vancouveriensis*, *Platysoma tibialis*, *Limneria compacta*, *Mesoleptus fasciatus*, *Phylax pacificus* and *Phylax niger*, are from Vancouver Island, and I am under the impression, for reasons which I will now state, that the specimens of these species from which M. Provancher's descriptions were made were from my collection, though no mention of my name appears in M. Provancher's paper.

In February, 1883, in response to the request of Mr. W. Brodie, of Toronto, I sent to him specimens of all the Vancouver Hymenoptera I then possessed. In June, 1883, Mr. Brodie returned named 81 species, which I have enumerated in vol. xvi., p. 77, of the CAN. ENT., and a few more were returned to me in Feb., 1885, but he made no mention whatever of the fact that any of the species named were new.

A reference, however, to my list will show that all of M. Provancher's new Vancouver species are there included, and it appears most probable, therefore, that he had my specimens from Mr. Brodie and wrote his descriptions from them. He acknowledges in the paper referred to that the insects were sent him by Mr. Brodie.

From what I know of M. Provancher, I feel sure that if he had been informed by Mr. Brodie that the specimens were not his own, but mine, he would have mentioned in his paper the name of the collector as well as the locality in which they were to be found.

Now, while I care but little about my name appearing as the captor of new species, I hold that such action as Mr. Brodie's results in a positive injury to science. First, because had I known that I possessed a number of new species, I should most certainly have placed them where they would have received greater care and have been of greater use than in my cabinet, viz., in the collection of some public museum. Secondly, had I been communicated with, I would have submitted to the describer a series of each species, for I have a series of all but one, and in some cases I have both males and females, and everyone will admit that a description made from a series is of much greater value than one made from a not-over good single specimen.

Of course it is just possible that the insects described were collected by some one else. If this is so, the coincidence is an extraordinary one.

CORRESPONDENCE.

A RARE SPHINX ADDED TO THE CANADIAN LIST.

Dear Sir: I wish to record as an addition to the Canadian fauna, the exquisite little Sphinx moth, *Pterogon Clarkiæ* Boisd., a perfect male of which has been generously presented to me by my friend, the Rev. G. W. Taylor. This little gem is well figured at No. 5, Plate xiii., of Strecker's Lepidoptera. The specimen in question was taken at Victoria, Vancouver Island, about May 15, 1884, while hovering over the flowers of a lilac bush in company with *Hemaris rubens* H Edw. and *Papilios Rutulus* v. *Arizoniensis* W. H. E., and *Eurymedon*. The coloration of this species is very beautiful. The general hue of the primaries is olivaceous, but

more of a brown than a green tint. The secondaries are bright yellow with a broad black marginal band and white fringe. The expanse of the wings is 1⅜ inches. The markings of the primaries somewhat resemble those of *Darapsa myron* Cram., and consist of a small dark patch on the costa near the base, a dark median band and discal spot, and a subterminal dark line which widens to a large triangular mark at the apex. The marginal black band in my specimen is much wider than in the specimen figured by Mr. Strecker. J. FLETCHER, Ottawa, Ont.

PERSONAL.

Dear Sir: In the last Report of the Agricultural Dept. of Washington, Mr. C. V. Riley speaks of the "general untrustworthiness" of my "work" as illustrated by my referring in my New Check List *Phycis juglandis* as a var. of *indiginella*, and using the term *Phycis* instead of *Acrobasis* (used formerly by me). As to the first, I did so because Le Baron thought *juglandis* might be a variety. I have usually been taken to task by Mr. Riley for considering varieties as species. In a Check List, I need not say, the author is not bound to know all about every species he includes. As to the latter, Haworth's name *Phycis* must be used for some genus of the *Phycidæ*. Dr. Walsh having used it for our species *indiginella*, led me to follow this example rather than for *Pempelia*. It should be remembered that these comments on the character of my work in this instance come from a person who in his descriptions of N. Am. *Phycidæ* failed to give a *single structural character* by which his species could be generically referred, as I have already shown. My classification of the *Pyralidæ* in the Check List has elicited the approval of Prof. Fernald, who is universally recognized as a high authority in this family. I am sorry that Mr. Riley should abuse Government Reports by inserting such personal and unwarranted remarks.

AUG. R. GROTE, Bremen, Germany.

BUTTERFLIES OF NORTH AMERICA.

We are glad to be able to announce that it is the intention of Mr. W. H. Edwards, author of that superb and well known work on the Butterflies of North America, to proceed with the third volume without delay. It will be the author's endeavor to maintain in every respect the high character of this work, which as it involves a very large outlay, will we trust be widely appreciated and meet with that liberal patronage which it so well deserves.

INDEX TO VOLUME XVII.

THE CANADIAN

ENTOMOLOGIST.

VOLUME XVIII.

EDITED BY

William Saunders, London, Ont.

JANUARY TO OCTOBER.

Rev. C. J. S. Bethune, M. A., Port Hope, Ont.,

OCTOBER TO DECEMBER.

ASSISTED BY

E. B. Reed, J. M. Denton, London, Ont.; G. J. Bowles, Montreal, Que.; G. Geddes, Dr. White, Toronto.

London:
PRINTED BY THE FREE PRESS PRINTING COMPANY.
1886.

LIST OF CONTRIBUTORS TO THIS VOLUME.

ALLIS, E. W. ..... ADRIAN, MICH.
ASHMEAD, W. H. ..... JACKSONVILLE, FLORIDA.
BATES, J ELWYN ..... ABINGTON, MASS.
BETHUNE, REV. C. J. S. ..... PORT HOPE, ONT.
BRODIE, W. ..... TORONTO, ONT.
BUNKER, ROBT. ..... ROCHESTER, N. Y.
CAULFIELD, F. B. ..... MONTREAL, QUE.
CLAYPOLE, E. W. ..... AKRON, O.
COQUILLET, D. W. ..... LOS ANGELES, CAL.
CURTIS, G. F. ..... LYNN, MASS.
EDWARDS, W. H. ..... COALBURGH, WEST VA.
ELIOT, IDA M. ..... STOWE, VERMONT.
FERNALD, MRS. C. H. ..... AMHERST, MASS.
FISCHER, PH. ..... BUFFALO, N. Y.
FRENCH, G. H. ..... CARBONDALE, ILL.
FYLES, REV. T. W. ..... SOUTH QUEBEC.
GEDDES, GAMBLE. ..... TORONTO, ONT.
GOODHUE, C. F. ..... WEBSTER, N. H.
GROTE, A. R. ..... BREMEN, GERMANY.
GUIGNARD, J. A. ..... OTTAWA, ONT.
HAGEN, DR. H. A. ..... CAMBRIDGE, MASS.
HALEY, GEO ..... BROWNFIELD, MASS.
HAMILTON, DR. JOHN. ..... ALLEGHENY, PA.
HANHAM, A. W. ..... HAMILTON, ONT.
HARRINGTON, W. HAGUE. ..... OTTAWA, ONT.
HAUSSEN, I. F. ..... MONTREAL, QUE.
HENSHAW, S. H. ..... BOSTON, MASS.
HOLLAND, REV. W. J. ..... PITTSBURG, PA.
HORN, DR. GEO. ..... PHILADELPHIA, PA.
HULST, REV. G. D. ..... BROOKLYN, N. Y.
JACK, J. G. ..... CHATEAUGUAY, QUE.
MOFFATT, J. ALSTON. ..... HAMILTON, ONT.
MONELL, J. T. ..... BONNE TERRE, MO.
OSBORNE, HERBERT. ..... AMES, IOWA.
PEABODY, S. H. ..... CHAMPAIGNE, ILL.
PROVANCHER, L. ..... CAP ROUGE, QUE.
REED, E. BAYNES. ..... LONDON, ONT.
RILEY, C. V. ..... WASHINGTON, D. C.
SAUNDERS, WM. ..... LONDON, ONT.
SCUDDER, S. H. ..... BOSTON, MASS.
SMITH, J. B. ..... WASHINGTON, D. C.
SOULE, CAROLINE G. ..... STOWE, VERMONT.
STRETCH, R. H. ..... SAN FRANCISCO. CAL.
STRUMBERG, C. W. ..... GALESBURG, ILL.
TAYLOR, G. W. ..... VICTORIA, BRIT. COLUMBIA.
TOWNSEND, C. H. T. ..... CONSTANTINE, MICH.
UNDERWOOD, L. M. ..... SYRACUSE, N. Y.
UHLER, P. R. ..... BALTIMORE, MD.
VANDUZEE, E. P. ..... BUFFALO, N. Y.

The Canadian Entomologist.

VOL. XVIII. LONDON, JANUARY, 1886. No. 1

TWELVE YEARS' EXPERIENCE WITH RUBBER STOPPERS. USED IN THE BIOLOGICAL COLLECTION OF THE MUSEUM IN CAMBRIDGE.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The late Professor L. Agassiz, in 1867, requested of me a detailed plan for the development of the entomological department of the Museum, Among the different collections proposed was a biological collection similar to my own for Neuroptera and Pseudo-neuroptera, but extended to include all Arthropoda. The Professor in a marginal note stated that this collection should be commenced immediately, and developed as rapidly as possible. In my collection the alcoholic objects were included in vials placed horizontally near the pinned dry objects, so that all belonging to one species were together and presented a clear view to the observer. I used vials closed with cork stoppers, which for a small collection and by a continual supervision, proved sufficiently safe. Nevertheless experiments were made with several substances, hoping to prevent the evaporation of the alcohol and the necessity of refilling a large number of vials every six months. This arrangement is, as stated, sufficient for a small collection, but when applied upon a comprehensive and extended scale, proves inadequate. The continual supervision and refilling of several thousand vials would have needed a considerably larger expense and a special assistant. The best velvety cork stoppers did not do as well here as in Europe, owing to the greater changes of temperature. Experiments were made during six years upon a large number of substances in the hope of increasing the efficiency of the cork stoppers. Fats, tallow, stearine to impregnate the cork, wax, sealing wax, different resins and varnish, shell-lac, iron-lac, guttapercha and India rubber in different solutions, thick oil paint, collodium, waterglass, very fine bladder around that part of the cork placed in the vial, and glue and paste to cover the external part of the cork with strong paper and bladder, were subjected to trial. Several of these substances were tried on an extensive scale and

for several years, all proving to be more or less unsatisfactory. Finally it was decided to use India rubber stoppers. Though these were decidedly more expensive, they have during twelve years given the most satisfactory results. A continual supervision and re-filling of carefully closed vials is unnecessary, and the greater outlay at first is after a few years more than repaid; time, alcohol and manual help are saved. At first the strong compression of the alcohol in placing the stoppers was the principal cause of insecurity of the filled vials, as the stoppers were very apt to slip out. In putting the stopper in the vial, I introduce now a fine insect pin (to be removed later), allowing the air to escape and thus preventing the strong compression of the alcohol (Ann. Rep. of the Museum for 1874, p. 13).

A small test vial, 70 m. m. long and 16 m. m. broad, filled in this way, October, 1873, was kept purposely for three years in the sunshine; the length of the air bubble retained in the vial was carefully measured, and found to be 14 m. m.; a year later the bubble had about the same length. In summer the bubble was smaller, owing to the greater expansion of the alcohol, proving at the same time the close fitting of the stopper. On November 14, 1882, the bubble was 20 m. m. long, and is now, October 6, 1885, 30 m. m. long. The vial was never opened during the twelve years, and is now in such a condition that it would not need re-filling if used in the collection. The collection contains many smaller vials and a number of larger ones (the largest for the larva of *Dynastes hercules*, 180 m. m. long and 50 m. m. broad), and with very rare exceptions, re-filling was not necessary. I would remark that all stoppers used are of vulcanized India rubber. The so-called pure rubber stoppers used for chemical purposes are probably better, but they were then not for sale in Boston, and are also 30 per cent. more expensive. During late years a number of them have been used to ascertain their reputed superiority. A disadvantage of the vulcanized stoppers is the formation of small crystals of sulphur in the alcohol, which attach themselves firmly to the insects, and are for delicate objects injurious. This disadvantage is, however, easily obviated, or at least very much diminished, when the stoppers are thoroughly washed before use, or better, are put half an hour in warm water.

The most important point was, how long these stoppers would do well, and when they would need to be replaced by new ones. To know exactly the average time of the efficiency of the rubber stoppers, it was necessary to know the number of vials in use. My assistant has counted them carefully. To Coleoptera belong 1,423; Lepidoptera, 1,547;

Pseudo-neuroptera, 979; Neuroptera, 454; Hymenoptera, 523; Galls, 171; Spiders, 644; Parasites, 208; Hemiptera, 57; Orthoptera, 14 (the last two orders are not arranged, and the rich biological material of the alcoholic collection of the Museum is not placed in vials); besides a large number not yet arranged in the boxes of the different orders. There are about 7,800 vials in use. The larger part of the collection presented by Mr. F. G. Schanpp, and the very large collection of the Peabody Academy, are not included in the above enumeration. For want of space, they have been stored provisionally in large glass jars filled with alcohol, in which the small vials with cork stoppers are placed.

Of the 7,800 vials with rubber stoppers, perhaps two-thirds were filled and labelled 10 and 12 years ago, the others in the successive years, half of them three years ago. More than half are of a size needing stoppers of 8 to 12 m. m. at the smaller end; two-thirds of the rest of 14 to 18 m. m.; the rest with larger ones 30 to 37 m. m. (milk stoppers), and a few as large as 42 m. m. Some vials, at times a large number, were opened for identification and study of the contents. A very small number had to be changed every year, and these were closed with pieces of rubber rope (of 6, 10, 12, 16, 25 m. m. diameter), which was used as an experiment, but proved to be unsuccessful. In addition to these, in each year during late years three or four of a certain size needed to be changed. These vials, 65 m. m. long by 8 m. m. broad, were closed by stoppers, which had to be forced 16 m. m. into the vials. The alcohol began to evaporate, the vials turned easily on the corks, which is never the case in well closing vials; the part of the stopper in the vial was somewhat smeared, and had lost its elasticity. Indeed these stoppers would have served probably longer by re-filling, but for greater safety they have been always changed. All these vials were closed twelve years ago, and they began to give out during the last few years. The part of the stopper outside of the vial always bulged out considerably, so that by this mark alone the vials to be changed were easily noticed. A part of these stoppers were not well made; when cut they are not solid throughout, but filled with numerous holes, representing a kind of fibrous tissue. The strong depression in the rubber trade during late years has caused the use of poorer material in vulcanizing; some numbers of the smaller sizes are now decidedly bad. Nevertheless, of all stoppers in use, less than one per mille gives out every year after twelve years' use, and in the first six years probably only one per two mille. Stoppers of the larger size keep

much better. After all, I think the result is a decided success. All the so-called pure rubber stoppers for chemical laboratories of American make are, as far as I am able to ascertain, manufactured of vulcanized rubber, which is not the case with those imported from Germany. The Professor of the chemical laboratory here has had the same experience. The 7,800 stoppers of different sizes have cost about $110; if they had been bought at once at wholesale figures, the price would have been 30 to 35 per cent. less.

As the stock in hand for the advancement of the collection has to be a large one, I may draw attention to a method recommended by Prof. W. Hempel, of Dresden, Saxony, to prevent the stoppers becoming too hard (Bericht d. Deutsch. Chem. Gesell., 1882, vol. xv., Heft. 6, No. 184). Rubber stoppers or tubes retaining their elasticity should be kept in large glass jars, in which an open vessel with petroleum has been placed. It is better to keep the light from the jar; wooden boxes should not be used. Stoppers which have become hard should be brought together in a jar with sulphuret of carbon until they are softened, and afterwards be kept in a jar with petroleum just as the others. Before knowing this I used to soften such stoppers by squeezing in different directions, or by rolling with a piece of board. Of course Prof. Hempel's method is better, as it prevents the gradual evaporation of the fluids used for the solution of the rubber in the process of vulcanization. It is remarkable that until now none of the stoppers in the vials arranged in wooden boxes have become hardened, though the same stoppers not fixed in vials with alcohol grew hard. Probably the strong pressure of the alcohol by fitting the stoppers has some influence in keeping them soft; besides, the part of the stopper outside of the vial is mostly small. I do not know whether rubber stoppers for similar purposes have been used here or in Europe earlier than in the Cambridge Museum; if so, I would be very glad to know the results obtained elsewhere.

PRELIMINARY LIST OF THE SPECIES OF ACARINA OF NORTH AMERICA.

BY HERBERT OSBORN, OF THE IOWA AGRICULTURAL COLLEGE, AND LUCIEN M. UNDERWOOD, OF SYRACUSE UNIVERSITY.

The Acarina, especially the more minute forms, have been but little studied in America, a fact which seems the more strange when we con-

sider what interesting objects they form for microscopic work. As in most groups of Arthropoda, the pioneer work in this country was done by Thomas Say, whose descriptions of a number of the larger species appeared as early as 1821. Later on Dana and Whelpley (1836), and Haldeman (1842), contributed descriptions of a few species. More recently Dr's. Fitch, Leidy, Packard, Riley, LeBaron and Shimer, and Mr. Ashmead, have published descriptions of species and notes on habits, while quite lately Mr. Harry Garman has published a valuable paper on the Phytoptidæ, which it is hoped he will follow up by still more extensive study of this family.

It is hoped that the following list of the Acarina of the United States and Canada—which we have made as complete as possible up to date—may encourage the further study of the group, and as an additional aid it may be in place to make a few statements concerning their habits and the methods of studying them.

The Trombididæ are found on plants or free as adults, frequently in the larval form, as parasites on insects. The Hydrachnidæ are aquatic, and probably many interesting parasitic forms will be found by careful examination of the gills of bivalve mollusks. Of the Gamasidæ occurring as parasites on insects but few of the probable number have yet been described. In the Acaridæ we have many parasitic forms on birds and mammals, and here especial care should be taken to identify with described European forms whenever possible, particularly in all cases where the bird or mammal host is identical in the two countries. Doubtless many described species occur commonly here which have never been recorded, e. g. *Myobia musculi* seems never to have been recorded in America, but has been taken at Ames, Iowa, and hence is included in our list. A few species common to domesticated animals that are being constantly imported from other countries have been included in this list, even when we have been unable to find a positive record of their occurrence here.

The Phytoptidæ are microscopic in size, and occur on buds, leaves and fruits, producing galls, deformations, blisters or rusts, and their study offers an almost unlimited field for careful investigation.

A large proportion of the mites are too small to be readily studied or preserved, except as microscopic objects, and the most desirable method is to mount them at once, or as soon after collecting as possible, in glycerine jelly or prepared balsam. It is frequently a great advantage to

examine them carefully with the microscope while still alive and moving.

The American literature on this subject, besides being quite scanty, is widely scattered, and some of the papers now quite difficult to procure.

Family TROMBIDIDÆ Leach.

I. *Tetranychus* Dufour.

1—T. TELARIUS Linn. Packard, Guide to Study of Insects, 660; Murray, Economic Entom., 97*; Saunders, Can. Ent. xii, 237* (1880); Insects Inj. to Fruit, 355* (1883); Ontario Entom. Rep., xi, 70* (1880); Forbes, Ill. Rep., xiii., 106 (1884); Standard Nat. Hist. ii., 103.

II. *Trombidium* Fab.

1—T. PARASITICUM Murray. Economic Entom., 129* (1877); Ont. Entom. Rep., xi., 71 (1880).

Atoma parasiticum, Latr. (1806). Riley, Mo. Rep., vii., 176* (1875).

Trombidium muscarum, Riley. First Rep. U. S. Entom. Com. 306–311 (1878).

2—T. SERICEUM Say. Jour. Phila. Acad. ii., 70 (1821); Coll. Writings ii., 16; Riley, Mo. Rep. vii., 175* (1875), et. Supp., 63; Murray, Economic Entom. 138* (1877); Ont. Entom. Rep. xi., 72 (1880).

3—T. GRYLLARIUM Murray. Economic Entom. 136* (1877).

Atoma gryllaria, LeBaron. Ill. Rep. ii., 61* (1871).

4—T. SCABRUM Say. Jour. Phila. Acad. ii., 69 (1821); Coll. Writings ii., 16; Riley, Mo. Rep. vii, 175 (1875).

5—T. GIGANTEUM Riley. First Rep. U. S. Entom. Com., 312 (1878).

6—T. BULBIPES Packard. Mass. Rep. iii., 26* (1873); Murray, Economic Entom. 136*; Ont. Ent. Rep. xi., 71.

LARVAL FORMS INCERTIS SEDÆ.

1—LEPTUS *(Trombidium ?)* AMERICANUS Riley, Mo. Rep. vi, 122 (1874); Murray, Economic Entom., 116.*

2—LEPTUS *(Trombidium ?)* ARANEÆ Say, Jour. Phila. Acad. ii., 80 (1821); Coll. Writings ii., 23.

3—LEPTUS *(Trombidium ?)* HISPUS Say, Jour. Phila. Acad. ii., 81 (1821); Coll. Writings ii., 23.

4—LEPTUS *(Trombidium ?)* IRRITANS Riley, Mo. Rep. vi., 122 (1874); Murray, Economic Entom., 116*; Ontario Entom. Rep. xi., 71.

* A star indicates an illustration at the reference marked.

5—OCYPETE *(Trombidium ?)* COMATA Say, Jour. Phila. Acad. ii., 82 (1821); Coll. Writings, ii., 23.

III. *Erythræus* Latr.

1—E. MAMILLATUS Say, Jour. Phila. Acad. ii., 70 (1821); Coll. Writings ii., 16.

Family BDELLIDÆ Duges.

I. *Bdella* Latr.

1—B. MARINA Packard, 1st Rep. U. S. Fish Com., 544 (1874); Guide to Study of Insects, 660; Am. Nat. xviii., 827* (1884); Standard Nat. Hist., ii., 103.

2—B. OBLONGA Say, Jour. Phila. Acad. ii., 74 (1821); Coll. Writings, ii., 19.

Family HYDRACHNIDÆ Sundeval.

I. *Limnochares* Latr.

1—L. EXTENDENS Say, Jour. Phila. Acad. ii., 80 (1821); Coll. Writings ii., 22.

II. *Hydrachna* Müller.

1—H. COCCINNEA Haldeman, Proc. Phila. Acad. i., 196 (1842).

2—H. FORMOSA Dana & Whelpley, Am. Jour. Science, 1st ser., xxx., 357* (1836).

3—H. NEBULOSA Haldeman, Proc. Phila. Acad., i., 196 (1842).

4—H. PYRIFORMIS Dana & Whelpley, Am. Jour. Science, 1st ser., xxx., 358* (1836).

5—H. 5-UNDATA Haldeman, Proc. Phila. Acad., i., 184 (1842).

6—H. SCABRA Haldeman, Proc. Phila. Acad. i., 184 (1842).

7—H. TRIANGULARIS Say, Jour. Phila. Acad. ii., 79 (1821); Coll. Writings ii., 23.

8—H. TRICOLOR Packard, Am. Jour. Science, 3rd ser., i., 108 (1871).

9—H. BELOSTOMÆ Riley, 1st Rep. U. S. Entom. Com., 312* (1878).

III. *Atax* Fab.

1—A. HUMEROSA. Standard Nat. Hist. ii., 102. Where described?

2—A. YPSILOPHORUS. Standard Nat. Hist. ii., 102. Where described?

IV. *Thalassarachna* Packard.

1—T. VERRILLII Packard. Am. Jour. Science, 3rd ser., i., 107 (1871); Standard Nat. Hist. ii., 102. Referred by Murray to *Pontarachna*.

Family GAMASIDÆ Leach.

I. *Sejus* Koch.

1—S. AURIS Murray, Economic Entomology, 167 (1877). *Gamasus auris* Leidy, Proc. Phila. Acad., 1872, 138.

II. *Dermanyssus* Duges.

1—D. AVIUM Duges ——. Murray, Economic Entom., 169*; Ont. Entom. Rep. xi., 73.

III. *Gamasus* Latr.

1—G. ANTENNÆPES Say, Jour. Phila. Acad. ii., 71 (1821); Coll. Writings ii., 17.

2—G. COLEOPTRATORUM Latr. ——; Packard, Guide to Study of Insects, 663; Murray, Economic Entom., 158*.

3—G. JULOIDES Say, Jour. Phila. Acad. ii., 72 (1821); Coll. Writings ii., 18.

4—G. MUSCULUS Say, Jour. Phila. Acad. ii., 72 (1821); Coll. Writings ii., 17.

5—G. NIDULARIUS Say, Jour. Phila. Acad. ii., 72 (1821); Coll. Writings ii., 17.

6—G. SPINIPES Say, Jour. Phila. Acad. ii., 71 (1821); Coll. Writings ii., 17.

IV. *Argas* Latr.

1—A. AMERICANA Packard, Rep. U. S. Geol. Survey of Montana, Idaho, Wyoming and Utah (Hayden) 740* (1872); Murray, Economic Entom., 182.

V. *Uropoda* Latr.

1—U. AMERICANA Riley, Proc. A. A. A. S. xxv., 273–275* (1877); Mo. Rep. ix., 41 (1877); Standard Nat. Hist. ii., 102.

2—U. VEGETANS DeGeer. ——; Packard, Guide to Study of Insects, 663; Murray, Economic Entom., 162*.

Family IXODIDÆ.

I. *Ixodes* Latr.

1—I. ALBIPICTUS Packard, Am. Nat. ii., 559* (1868); 1st Ann. Rep. Peabody Acad. Science, 65 (1869); Am. Nat. iii., 365 (1869); Guide to Study of Insects, 662*; Standard Nat. Hist. ii., 100*.

2—I. AMERICANUS Latr. ——. Fitch, N. Y. Rep. xiv., 363 (1871).

3—I. ANNULATUS Say, Jour. Phila. Acad. ii., 75 (1821); Coll. Writings ii., 19.

4—I. BOVIS Riley, Packard, 1st Ann. Rep. Peabody Acad. Science, 68 (1869); Rep. U. S. Geol. Survey of Montana, Wyoming and Idaho (Hayden) 740* (1872); Guide to Study of Insects, 663, 668*; Murray, Economic Entom, 193; Osborn, Bull. Iowa Agr. Coll., 75 (1884).
5—I. CHORDEILIS Packard, 1st Ann. Rep. Peabody Acad. Sci., 67 (1869).
6—I. COOKEI Packard, 1st Ann. Rep. Peabody Acad. Sci., 67 (1869).
7—I. CRENATUS Say, Jour. Phila. Acad. ii., 76 (1821); Coll. Writings ii., 20.
8—I. CRUCIARIUS Fitch, N. Y. Rep. xiv., 366 (1871).
9—I. ERRATICUS Say, Jour. Phila. Acad. ii., 77 (1821); Coll. Writings ii., 20.
10—I. FUSCUS Say, Jour. Phila. Acad. ii., 79 (1821); Coll. Writings ii., 22.
11—I. LEPORIS-PALUSTRIS Packard, 1st Annual Rep. Peabody Acad. Science, 67 (1869).
12—I. NIGROLINEATUS Packard, 1st Ann. Rep. Peabody Acad. Science, 66 (1869).
13—I. ODONTALGIÆ Fitch, N. Y. Rep. xiv., 371 (1871).
14—I. ORBICULATUS Say, Jour. Phila. Acad. ii., 76 (1821); Coll. Writings ii., 21.
15—I. PUNCTULATUS Say, Jour. Phila. Acad. ii., 78 (1821); Coll. Writings ii., 21.
16—I. 5-STRIATUS Fitch, N. Y. Rep. xiv., 366 (1871).
17—I. ROBERTSONII Fitch, N. Y. Rep. xiv., 366 (1871).
18—I. SCAPULARIS Say, Jour. Phila. Acad. ii., 78 (1821); Coll. Writings ii., 21.
19—I. UNIPUNCTATA Packard, 1st Ann. Rep. Peabody Acad. Science, 66 (1869); Guide to Study of Insects, 662, 668.*
20—I. VARIABILIS Say, Jour. Phila. Acad. ii., 77 (1821); Coll. Writings ii. 21.

Family ORIBATIDÆ Nicolet.

I. *Oribata* Latr.

1—O. ASPIDIOTI Ashmead, Can. Entom. xi., 93 (1879); Saunders, Insects Inj. to Fruit, 396 (1883).
2—O. CONCENTRICA Say, Jour. Phila. Acad. ii., 73 (1821); Coll. Writings ii. 18.
3—O. GLABRATA Say, Jour. Phila. Acad. ii., 73 (1821); Coll. Writings ii., 18.
4—O. QUADRIPILIS Fitch, N. Y. Rep. iii., 442 (1856).

II. *Nothrus* Koch.

1—N. OVIVORUS Packard, Guide to Study of Insects, 664,* Riley, Mo.

Rep. ii., 102 (1870); 3rd Rep. U. S. Entom. Com., 175* (1883); Standard Nat. History, ii., 102*.

III. *Hoplophora* Koch.

1—H. ARCTATA Riley, Mo. Rep. vi., 53, 81 (1874); Murray, Economic Entom., 225*; Saunders, Insects Injurious to Fruit, 239* (1883); Ontario Entom. Rep., xiii., 66; Standard Nat. Hist. ii., 102*.

Family ACARIDÆ.

I. *Tyroglyphus* Latr.

1—T. MYCOPHAGUS Megnin. Jour. Anat. Phys. (1874)*; Ontario Entom. Rep. xi., 73*.

Rhizoglyphus mycophagus Murray, Economic Entom., 262*.

2—T. PHYLLOXERÆ Riley, Mo. Rep. vi., 52, 53, 81 (1874); Saunders, Can. Ent. xiv., 127* (1882); Insects Inj. to Fruit, 239* (1883); Ontario Entom. Rep. v., 61; xiii., 66; Standard Nat. Hist. ii., 100.

Rhizoglyphus phylloxeræ Murray, Economic Entom., 258*.

3—T. ENTOMOPHAGUS Laboul., Ann. Soc. Ent. Fr. (1862); Murray, Economic Entom., 263; Ontario Entom. Rep., xi., 73.

4—T. SIRO Latr.——(*Acarus siro* L., *Tyroglyphus farinæ*, *T. sacchari* Auct.) Packard, Guide to Study of Insects, 665; Murray, Economic Entom., 267*; Saunders, Can. Ent., xii., 237* (1880); Ontario Entom. Rep., xi., 74.

5—T. GLOVERI Ashmead, Amer. Entomologist, new series, I., 106 (1880); Saunders, Insects Injurious to Fruit, 391 (1883).

Acarus? Gloveri Ashmead, Can. Ent., xi., 159 (1879).

6—T. LONGIOR Gervais (1844); Am. Nat. xvi., 599; Murray, Economic Entom., 267*; Ontario Entom. Rep., xi., 74.

7—T. MALUS Riley, Mo. Rep. v., 87* (1873); Murray, Economic Entom. 275*; Ontario Entom. Rep. xi., 74*; Osborn, Bull. Iowa Agric. Coll. 59 (1884).

Acarus? malus Shimer, Trans. Am. Entom. Soc., i., 368 (1868).

8—T. RIBIS Fitch, N. Y. Rep. iii., 424 (1856).

9—T. ACERIS.

Acarus aceris Shimer, Trans. Am. Entom. Soc., ii., 320 (1869).

II. *Cheyletus* Latr.

1—C. SEMINIVORUS Packard, Guide to Study of Insects, 665, 668*.

III. *Sarcoptes* Latr.

1—S. CATI Hering & Gerlach —— ; Murray, Economic Entom., 302 ; Osborn, Bull. Iowa Agric. Coll. 76 (1884).

2—S. MUTANS Robin & Lang, Comptes-Rendus xlix. (1859) ; Murray, Economic Entom. 305*; Osborn, Bull. Iowa Agric. Coll., ii., 76.

3—S. SCABIEI Latr.—— ; Murray, Economic Entom., 292*; Packard, Guide to Study of Insects, 666; Ontario Entom. Rep. xi., 75*; Osborn, Bull Iowa Agric. Coll. 76 (1884); Standard Nat. Hist. ii., 100*.

IV. *Psoroptes* Gerv.

1—P. EQUI Gervais, Ann. Soc. Nat. (1841) ; Murray, Economic Entom., 308*; Packard, Guide to Study of Insects, 666; Osborn, Bull. Iowa Agric. Coll. 76 (1884).

Dermatodectes equi Gerl., *D. bovis* Gerl., *D. ovis* Gerl., *Dermatokoptes communis* Furst.

V. *Symbiotes* Gerl.

1—S. BOVIS Gerlach —— ; Murray, Economic Entom. 313* ; Osborn, Bull. Iowa Agric. Coll. 76 (1884).

Sarcoptes bovis Hering, *Chorioptes caprœ* Gerv., *Symbiotes equi* Gerl., *Sarcodermatodectes caprœ* Delaf. & Bour., *Dermatophagus bovis* Furst.

VII. *Myobia* Claparede.

1—M. MUSCULI Schrank —— ; Murray, Economic Entom., 315*.

VIII. *Pterolichus* Robin.

1—P. FALCIGER Megnin.—— Garman, Am. Nat., xviii., 430* (1884).

IX. *Dermaleichus* Koch.

1—D. PICI-PUBESCENTIS Packard, Am. Nat. iii., 493, plate vi., figs. 1, 2, 3 (1869) ; Guide to Study of Insects, 666 ; Weed., Am. Nat. xviii., 633 (1884).

X. *Cytoleichus.*

1—C. SARCOPTOIDES Megnin, Am. Nat. xvii., 422 (1883).

XI. *Demodex* Simon.

1—D. FOLLICULORUM Simon —— ; Murray, Economic Entom., 329* ; Packard, Guide to Study of Insects, 667 ; *Faxon*, Bull. Museum Comp. Zool. v., No. 2*; Standard Nat. Hist., ii., 100*.

2—D. PHYLLOIDES Csokor. Verhandl. der K. K. Zool-bot. Gesell. in Wien., xxix., 419 (1879) ; Am. Nat. xvi., 1009 (1882) ; xvii., 1113 (1883).

XII. *Phytoptus* Dujardin.

1—P. ABNORMIS Garman. Appendix to Ill. Rep. xii., 134 (1883).
2—P. ACERICOLA Garman. Appendix to Ill. Rep. xii., 135 (1883).
3—P. FRAXINI Garman. Appendix to Ill. Rep. xii., 136 (1883).
4—P. OLEIVORUS (Ashmead).—Hubbard, Rep. U. S. Entom. 1884, 363–373*.
Typhlodromus oliivorus Ashmead, Can. Ent., 160 (1879).
5—P. QUADRIPES Garman. Appendix to Ill. Rep. xii., 132*, 135 (1883); Osborn, Bull. Iowa Agric. Coll., 57 (1884).
Vasates quadripes Shimer, Trans. Am. Entom. Soc. ii., 319 (1869).
6—P. QUERCI Garman. Appendix to Ill. Rep. xii., 138 (1883).
7—P. PYRI Murray, Economic Entom., 340*, 358 (1877); Garman, Appendix to Ill. Rep. xii., 140 (1883); Osborn, Bull. Iowa Agric. Coll. 56 (1884).
Typhlodromus pyri Scheuten, Wiegman's Archiv. (1857); Packard, Guide to Study of Insects, 666, 668*.
8—P. SALICOLA Garman, Appendix to Ill. Rep., xii., 138 (1883).
9—P. THUJÆ Garman, Appendix to Ill. Rep., xii., 138* (1883).
10—P. ULMI Garman, Appendix to Ill. Rep., xii., 136 (1883).

INCERTIS SEDÆ.

1—HYPOPUS CONCOLOR Hald., in Terrestrial Air Breathing Mollusks of the U. S. (Binney), ii., 107.
2—ACARUS? SEMEN Walsh, Proc. Am. Entom. Soc., iii., 606.
3—ACARUS? ÆNIGMA Walsh, Proc. Am. Entom. Soc., iii., 608.

ELAPHIDION PARALLELUM, NEWM., AND PHYMATODES VARIABILIS, FAB.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

In the Oct. number of this journal I noticed with interest the article by Mr. Clarkson on *Elaphidion villosum*, Fabr. I have reason to believe that the same is partly the case also with *E. parallelum*, Newm., which I find to be the common oak-pruner here. But I do not agree that it is always, or even in the majority of instances, the case with either species.

As bearing on this subject I give the following extract from my notes for 1885, which relates also to *Phymatodes variabilis*, Fab. :—

" Last fall (Sept.) I laid in a large supply of red, white and black oak and hickory twigs, containing larvæ of oak-pruners. The majority were red oak and hickory, but all were kept in separate boxes. Also a large box full of sawed hickory wood which contained wood-boring larvæ. These were all kept regularly moistened. During May and June, as I was absent from home at the time, another person, a lady, collected and saved for me a bottle full of beetles from the vicinity of these boxes (all taken from and around the large box of hickory wood, she says). These I afterward examined, and found the bottle to contain 145 *Phymatodes variabilis*, Fab., and 18 *Elaphidion paralleum*, Newm., besides two *Tenebrionidæ* of uncertain origin. As to which the two species proceeded from, the twigs or the hickory wood, the lady, who examined the twigs from time to time without being able to discover a single specimen among them, is almost certain that they all came from the large box of sawed hickory, on the underside of the papers covering which she was able to pick them off in large numbers, as well as all over and around the box and on the wood inside. Upon examining a good number of the twigs of each kind later in the season, I found not an insect in them (with the exception of one which contained a dried and shrivelled larva that had not transformed), but they showed every sign of the insects having emerged as perfect beetles. The *E. parallelum*, Newm., must have come from the twigs, while the *P. variabilis*, Fab., all proceeded from the sawed hickory wood. Packard gives the latter species as living only in white oak, but I am confident that these came from hickory, though I cannot conceive what became of the other numerous *Elaphidions* which must have emerged from the twigs."

In my notes for 1884, under date of 18th Sept., I extract also the following :—" Found an oak-pruner in the pupa state, inclosed in its silken white cocoon, inside a red oak twig. The end of the twig was not closed up, as is usually the case, but the passage was open, and a couple of inches up from the end the larva had changed to the pupa state, leaving its cast off skin below it in the passage."

Upon reading the account by Dr. Fitch, of *E. villosum*, Fabr., I find he says that " some of the worms enter their pupal state the last of autumn, and others not till the following spring. Hence, in examining the fallen limbs in the winter, a larva may be found in one, a pupa in an-

other." Now, though I have found the pupa of *E. parallelum*, Newm., very early in the fall (18th Sept., as stated above), and Mr. Clarkson has found the imago of *E. villosum*, Fabr., in November, I am inclined to think that these early metamorphoses were from eggs deposited earlier than others, or that by some favorable circumstances these individuals developed more rapidly and thus metamorphosed earlier. It is my opinion that both these species may assume the imago state either in the fall or the following spring, some, more forward than others, attaining this state in the fall. Perhaps favorable years, when some of the eggs may be deposited earlier in the summer than usual, produce the autumn imagos, which then remain within the twigs during the winter and emerge early in the spring. These in turn, if the season is at all favorable, will lay their eggs earlier than the others, and thus continue the early metamorphosis.

Toward the conclusion of his account Dr. Fitch says that "in at least three-fourths of the fallen limbs no worm is to be found," it having been devoured by birds either at the time the branch fell or afterward. The ground under oak and hickory trees here I have known some years (1884) to be covered with the twigs early in September, blown down by heavy winds, and at such times nearly all of the larvæ are destroyed by insectivorous birds, which extract them from their burrows, if they have not already been dislodged. This explains why so few of the beetles were obtained from the twigs I had saved—only 18 beetles from a large supply of the twigs, every one of which had certainly fallen that season, and been occupied at the time—the birds had destroyed all the others, and that very soon after their fall! But I cannot concur in the view taken by Dr. Fitch, that the larva severs the branch that it may fall to the ground, thus to aid its transformation. It is very probable that the larva cuts the twig to stop the flow of sap, the dead wood being necessary to mature its growth, and is conscious of none of that "consummate skill and seemingly super-terrestrial intelligence" which the worthy Doctor so enthusiastically attributed to it.

MISCELLANEOUS NOTES ON BUTTERFLIES, THEIR LARVÆ, ETC.

BY W. H. EDWARDS, COALBURGH, W. VA.

2. On the scarcity of certain Species in 1885.

The most notable instance was that of *C. Philodice*, which is usually

a very common species here. Throughout the year I saw but three or four examples.

In 1884, *V. Cardui* was remarkably abundant, as it seems to have been all over the Northern States. But in 1885 I scarcely saw one.

The Argynnids *Cybele* and *Aphrodite* were conspicuous for their absence in '85; so also *Phyc. Nycteis* and *Tharos*. For several years *P. Ajax* and *Turnus* have been far less common than formerly, though no change has taken place in the abundance of their food-plants. As to *Arg. Diana*, I have seen but two examples in as many years, and the species is practically extinct here.

2. As to Food Plants of *P. Ajax*.

The only plant known to me is the Pawpaw, Asimina. At the Philadelphia meeting of the A. A. A. S., 1884, Mr. E. M. Aaron stated that *Ajax* larvæ fed on spice-wood and upland huckleberry; and in a letter to me subsequently, that of his own knowledge, he knew *Ajax* would lay eggs on spice-wood, and that the larvæ fed both on that plant and sassafras.

I tried in vain, in 1885, to make these larvæ eat either spice-wood or sassafras, giving both to the young just out of egg, and before their taste could have been prejudiced against these plants by having eaten pawpaw. The larvæ starved to death, and I could not see that a leaf was even nibbled. I then tried larvæ immediately after successive moults to the last, with same result. So that I am satisfied *Ajax* larvæ in this region will not eat the plants spoken of. For Tennessee, where Mr. Aaron's observations were made, I do not undertake to speak. The only butterfly larvæ which will eat spice-wood and sassafras, so far as I know, are those of *P. Troilus* and *P. Palamedes*, and they are restricted to these and allied plants.

3. Pap. Palamedes. This species has been taken at Glencoe, Nebraska, as Mr. G. M. Dodge writes me, many degrees farther to the north than has before been observed.

4. Chionobas Bore, Schn. and Hübner.

In the paper on "Insects in Arctic Regions," the translation of which is printed in Can. Ent., xvii., p. 157, the author, Herr Aurivillius, says: "Let us take as an example Oeneis *Bore*, Schn., a true hyperborean butterfly, which has never been found outside the Arctic circle, and even there only occurs in places which bear a truly arctic stamp." In the note

appended, the editor of C. E. says that Mr. Edwards "informs us that Mr. David Bruce has taken *C. Taygete* Hüb., which is syn. of Oeneis *Bore* Sch., in Colorado," Not being satisfied that Mr. Bruce's examples were *Taygete* Hüb., I sent a male, one of them, to Dr. Staudinger, who replied, 16th Oct., 1885: "The Chionobas agrees perfectly with some *Bore* Hüb., from the highest northern region of Europe, the Varanger Fjord. *Bore* is a very variable species, and offers all passages to *Taygete* Hüb., so that I consider the latter as the Labrador form of *Bore.* Now that the true *Bore* is also discovered in Colorado is a very interesting fact; it would be interesting to see a large series of this Colorado form, to know if there also will be passage to the Labrador *Taygete.*" I saw six examples of this *Bore*, taken by Mr. Bruce, and they were all of one pattern, so that I do not believe any passage into *Taygete* will be found in Colorado. In the absence of such, I shall regard *Bore* as a species distinct from *Taygete.* It may be one species in Europe, but so far as appears is thoroughly distinct in America.

On the end of abdomen of one of the females sent me by Mr. Bruce was an egg shell adhering to the hairs. By softening the butterfly, I was able to get this off in fair condition, so that Mrs. Peart has found it possible to make an excellent drawing of it. I do not despair of yet obtaining eggs of this species and rearing the larvæ. Mr. Bruce found *Bore* on the highest summits visited by him.

5. CHIONOBAS NORNA, Thunb.

This species has hitherto been supposed to be limited to Europe and Asia. But I have received three females of it from northern Alaska. One I sent to Dr. Staudinger, who writes, 29th Nov., 1885: "As far as I can judge from this one bad specimen, it is a dark variety of *Norna.* This is a very variable species, which I receive also from North and Central Asia, and from whence I have some specimens like to this one sent, although *Norna* is generally lighter colored." The other two females were nearly perfect, and no doubt they are *Norna.* I hope to figure both *Bore* and *Norna* in vol. 3, But. N. A.

6. On feeding Larvæ after Frost has killed the Leaves.

Mr. A. H. Mundt, of Fairbury, Ills., has told in a former number of CAN. ENT. how he fed belated larvæ of *P. Cresphontes* on dried leaves of the prickly ash, which he softened in water, and that his larvæ went to pupation. He writes, 13th Nov., '85: "I have still five larvæ of *Cres-*

phontes. I forgot to get food for them before it froze, but found in a book a lot of leaves of Ptelea trifoliata (Hop-tree) gathered two years ago last spring. These I soaked over night, laid between blotting paper, and put in the glass. The larvæ eat them readily." This shows the way to carrying through belated larvæ in the fall, but also how larvæ from far off regions may be saved, if the dried leaves of their plants are sent with them.

7. Larvæ supposed to have been killed by Electricity.

Miss Annie M. Wittfeld wrote me 23rd Sept., 1884, from Georgiana, Fla.: " Yesterday about daybreak, the sky was completely clear. Some twenty minutes later a small black cloud rose in the southeast, and moved very fast, though there was a dead calm with us. All of a sudden came a stroke of lightning and at the same instant a fearful clap of thunder and a puff of wind that took all before it. It lasted but a second and then all was clear and calm again. After breakfast I went to my glass of Limenitis *Eros* larvæ, of which I had six fully grown, and found all to be dead and stiff, All my other larvæ were not affected; these last were in wooden boxes, while the *Eros* were between glass."

8. On pairing Butterflies in Captivity.

It is common enough for certain Sphinges and Bombycidæ to mate in boxes, and immediately after leaving pupae. This may happen when the eggs are mature at birth of insect. With many species of butterflies the eggs do not mature for several days after chrysalis, as is the case with the large Argynnids, but with others, as Phyciodes *Tharos* and *Nycteis* and *Myrina*, they are mature from the start. I have not experimented in this direction, but from what Miss E. L. Morton, of Newburgh, N. Y., tells me, it may be possible to induce butterflies of some species to mate and so to obtain eggs, for the eggs are laid very shortly after copulation, as I have several times observed. Miss Morton had by mistake placed a male Satyrus *Alope* under a bag of netting on grass. Three days later she introduced a female, which up to that time was supposed to be the second female. Almost immediately the pair mated, and a few hours later eggs were laid. In attempting to get eggs in this manner, it would be best that a male caught in the field should be introduced to a female just from chrysalis, for in the field it is these last which are sought by the males. Almost always when a pair of butterflies in copulation are taken

the male will be found worn or broken, while the female is uninjured in wing, and therefore must have lately left the chrysalis.

9. Effect of Cold applied to certain Larvæ.

I was feeding a brood of Coenonympha *Ampelos*, in June, from eggs sent from Vancouver Island, by Mr. Fletcher. After second month all the larvæ showed signs of lethargy except one, which went rapidly to pupa, having passed but three moults. (At same time I was feeding larvæ of *C. Galactinus* from eggs sent by Prof. Rivers, from California, and all these pupated after but three moults. From the pupæ came *Californius*, proving this species to be seasonally dimorphic, *Galactinus* being the winter, *Californius* the summer form.)

The remaining *Ampelos* larva spoken of at last rested asleep. Early in August, I placed them on ice, temp. about 32°, and there left them three months, till 7th Nov., having in mind to delude them into a belief that winter was over and gone when they should be brought into warm air again. The experiment succeeded perfectly as to part of the larvæ On 21st Nov., one passed 3rd moult, and 2nd Dec. a 4th moult, and 30th Dec. pupated. Another passed 3rd moult 23rd Nov., but has not yet reached the 4th (as I write 5th Jan. '86.) In fact, these larvae feed and move about only when placed in sunshine, and cloudy days and cold nights retard their growth. Two other larvae seem to have gone to sleep again, and have not moulted since they left the ice. It is usual for larvae to pass a moult soon after the end of hibernation, apparently to get rid of the shrunken skin, and this is an extra moult. At least, I have found this so, whenever the larvae hibernate half grown, so that *Ampelos* should pass four moults if hibernated, though three are the rule in summer.

ON TWO NEW HEMIPTERA-HETEROPTERA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Among a very interesting collection of Mexican and other Hemiptera sent to me by Mr. Samuel Henshaw, Curator of Boston Society of Natural History, for identification, I find two species new to science and peculiar to genera never before detected in North America, although both are well represented in the European fauna.

In the first genus, *Stenocephalus* A. & S., in Europe, four species are known, principally peculiar to the southern portions of that continent.

These are:—*S. agilis*, Scop.; *S. setulosus*, Ferrari; *S. medius*, Mls. Rey, and *S. neglectus*, H. S.

In the other genus, *Cantacader*, A. & S., two species only are known —*C. quadricornis*, and *C. Staudingeri*, Baer., also from south Europe.

Now, the detection of representatives of these genera in North America is especially gratifying to me, and below will be found full generic and specific descriptions.

FAMILY COREIDÆ.

Stenocephalus, A. & S.

Gen. char.—Head triangular, prolonged anteriorly between the antennæ with its extremity bifid; eyes large, globular, prominent; antennæ very long, hairy; first joint thickened, a little shorter than the head; second joint slender, much longer than the first; third shortest; fourth about as long as the second and slightly stouter; beak attaining to the base of the intermediate legs; first and second joints about equal in length; third and fourth shorter; prothorax trapezoidal, narrowed anteriorly, and with the posterior angles not very prominent: scutellum triangular, moderate sized; elytra with corium long and membrane with five or six longitudinal veins, sometimes forked; abdomen not quite as long or sometimes a very little longer than the elytra and rounded posteriorly; legs moderately long, hairy, without spines; femora but slightly curved, subequal in length.

Stenocephalus Mexicanus, n. sp.

Length, .43 inch. Brownish pubescent, form of *Stenocephalus neglectus*, H. S., but more robust, and thickly and finely punctate, punctures black; head blackish; antennæ: first joint stout, black, more densely pubescent than other joints; second joint but slightly longer than fourth, with two yellowish white annuli; third joint shortest, with a yellowish white annulus at base; fourth joint with a small yellowish white annulus at base and another in the middle; beak with first joint yellow; second joint yellow beneath, above and joints third and fourth piceous; the extreme tip of scutellum is yellow. The membrane of wing is brown with six longitudinal veins, the first and last being forked, and the stout vein at base, or where it joins the corium, yellow; legs: anterior femora black, excepting at base, which is yellow, tibiæ for a third of their tips and at base black, balance yellow, tarsi black; intermediate and posterior femora yellow for more than half their length, balance black; tibiæ and tarsi same as anterior pair.

Described from one specimen, Isthmus of Tehuantepec, Mexico, F. Sumichrist.

This is the first of the genus described from North America, and is very closely related to *S. neglectus*, H. S.

It is at once distinguished from that species, however, by a more robust form, a different antennal and abdominal coloration, and by the membrane not quite reaching the tip of the abdomen.

FAMILY TINGITIDÆ.

Cantacader, A. & S.

Gen. char.—Head elongated and projecting but little between the antennæ; front horned; eyes small, globular, not prominent; antennæ slender, very long; the first two joints short, second very long, fourth short, pointed fusiform; beak lying in a well pronounced groove, and reaching nearly to the base of the posterior legs; prothorax somewhat abruptly rounded at its posterior border and not prolonged to a point, although the scutellum is not uncovered. The other characters are those of *Monanthia*.

Cantacader Henshawi, n. sp.

Length, .23 inch. Yellowish brown, elongate, narrowed anteriorly, and gradually widened posteriorly, with the wings extending beyond the abdomen: head brownish on vertex with three pale horns, two just back of antennæ and the third in the centre just back of these, with their points converging forward towards each other, two pale but prominent lateral carina, one on each side, extending from base of antennæ back to prothorax, more prominent posteriorly; eyes brown; antennæ: first and second joints short, stout, brownish, the first twice the length of the second; third joint extremely long, slender, paler in color, and abruptly thickened and black at tip; fourth joint longer than first, fusiform, black; thorax with lateral margins reflexed, and with three prominent carina; wings long with the raised veins piceous and the reticulated cells small; abdomen and legs brownish yellow, with the extreme tips of tibiæ and tarsi and claws black.

Described from one specimen sent me by Mr. Samuel Henshaw, labelled Boston, July 7th, 1879, to whom I take pleasure in dedicating the species.

It is the only species of the genus described from North America, and is a very easily recognized species.

The Canadian Entomologist.

VOL. XVIII. LONDON, FEBRUARY, 1886. No. 2

NOTES OF 1885 ON SOME INJURIOUS AND OTHER COMMON INSECTS.

BY JOHN G. JACK, CHATEAUGUAY, QUEBEC.

Read before the Montreal Branch Ent. Soc. of Ont., 9th Feb., 1886.

The past season was remarkable, in our locality, for the general scarcity of diurnal Lepidoptera, and also of many of the Coleoptera, especially among the Scarabeidæ, Cerambycidæ and Buprestidæ. Many species of these, usually plentiful, seemed rare this year, and even *Lachnosterna fusca* was not nearly so abundant or injurious as it is generally. Perhaps, with the exception of *Colias philodice*, the most common butterfly was *D. archippus*, which I have never seen so common. I do not think I saw a single specimen of *P. cardui*, although it was very abundant last year. *Pieris rapæ* was less numerous and appears to be decreasing in numbers every year, largely owing, no doubt, to the attacks of the parasite *Pteromalus puparum*. The birds also, especially the Fly-catchers, do not get full credit for the good work they do. Insects of all other orders seemed to be about as abundant as usual, and several species proved to be more than usually numerous and destructive.

The Buffalo Tree-hopper (*Ceresa bubalus* Say) was again very abundant, doing very much injury to apple and pear trees in young orchards. On July 5th I found some larch trees (*Larix Americana*) with the foliage very much destroyed by Saw-fly larvæ, and on examining the trees in the woods and surrounding country, I found that they were all attacked. At this time most of the larvæ seemed to be a little more than half grown, and they continued to feed until about July 15th, when some of them made cocoons. Many of the trees were now entirely defoliated, and the branches and twigs literally covered with the larvæ, many of which were dropping to the ground, and with the falling "frass" made a sound like that of fast falling rain drops. Three days later (July 18) very few of the larvæ were to be found, most of them having formed cocoons among the old

leaves and debris, or in the loose surface soil at the base of the trees or in the vicinity. When collecting some of these cocoons on July 19th, I found that very large numbers had already been collected and the larvæ taken out by some small animals, probably mice and moles, as there was a perfect network of small burrows under the old leaves and grass. The empty cocoons were collected into little heaps, and a very large handful could often be gathered at a single grasp.

Having been kept in a moderately warm room, some of the imagines emerged from the cocoons on December 22nd, and continued to do so almost daily until January 17th of this year. The larvæ, cocoons and imagines agreed exactly with the figures of *Nematus Erichsonii* (Hortig), in Prof. Riley's report to the U. S. Department of Agriculture for 1883.

I had noticed these larvæ on the larch trees in former years, but they were not so generally abundant, and I had not the opportunity to study them.

My father has told me that about thirty years ago the tamarack woods were entirely defoliated, and looked as though scorched by fire, and he thinks that the saw-fly larvæ were probably the cause. It was more noticeable at that time, as there were large tracts of land covered with tamarack forest that have now entirely disappeared.

Another insect has proved to be peculiarly injurious this season to young growing beans. It is a small dipterous fly, and specimens sent to Prof. Riley were determined by him as *Anthomyia angustifrons*, Mirgen (=*A. colopteni*, Riley), the larvæ of which have been hitherto known to feed upon the eggs of *Caloptenus*. During the past summer the larvæ attacked a field of golden wax beans that were planted about June 15th, and on that part of the field that was most seriously injured, at least nine-tenths of the crop was destroyed. About ten days after planting, as very few of the beans had grown to the surface of the ground, an examination was made for the cause, and it was found that nearly every bean was infected by from 1 or 2 to 20 or 25 small, long, white maggots. Some of the beans attacked had hardly sprouted, while most of them had grown from one to two inches, but being planted deeply, they had scarcely reached the surface. Both the stems and seed-leaves were attacked. These larvæ were first noticed on June 25th; by the 28th many of them had pupated, and hardly a maggot could be found after July 2nd. The flies emerged

about July 10th. If this bean-feeding habit of the insect should become general, it might prove very annoying.

Grasshoppers of several species were very abundant and injurious, hundreds of bushels of grain having been destroyed by them, while pasture and grasses were much injured, and many young fruit trees were defoliated. Some farmers reported in early September that their buckwheat had been so devoured by grasshoppers that only the stumps of the stalks remained.

Cicada canicularis Harr. was not so common this season as it has been some years.

Females of the fall canker-worm moth *(Anisopteryx pometaria)* were taken depositing eggs on apple trees, Nov. 21–24. This insect is not common in our part of the country, and is not noticeably injurious.

Larvae of the pear-tree slug *(Selandria cerasi)* were found as late as Oct. 30th, or later. They are not abundant and give us no trouble.

The fall web-worm, *Hyphantria textor*, has become more abundant and troublesome during the past three or four years. Young larvae were first noticed July 10th, and new lots continued to hatch until about the middle of August.

A fresh specimen of the cotton moth *(Aletia xylina* Say) was taken Sept. 19th.

On July 12th, a large number of small parasitic flies emerged from a dead cut-worm (Noctuidae). These parasites are evidently the *Copidosoma truncatellum* Dalman, which is so well figured by Prof. Riley in his Report to the U. S. Dept. of Agr. for 1883.

Early in December I took a living specimen of *Cyrtophorus verrucosus* Oliv. in the wood of wild red cherry *(P. pennsylvanica* Linn.), and also found a large number of larvæ which I think were of the same species, as they occupied similar cavities to that of the beetle. The larvae of a Lepidopterous insect (probably Ægerian) was found under the bark of the same tree.

On Dec. 8th, a living pupa of *Tremex columba* was taken from the heart of a green beech log, the log being over ten inches in diameter. At the same time larvae of *Saperda calcarata* were taken from the heart of *Populus tremuloides*.

NOTES ON STAPHYLINIDÆ.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The following are some notes on a dozen of the more interesting species of *Staphylinidæ* which I have found in this vicinity. Two of the species, which will be duly given, were determined by M. Fauvel. All the others were identified by Dr. Horn.

Falagria dissecta Er. Numbers of this almost minute species were taken 8 Oct., 1884, in, on and under decaying and rain-soaked fragments of a large, reddish-tinged fungus growth, which I had previously plucked and broken to pieces to obtain *Phenolia grossa* Fab.

Homalota festinans Er. This species was determined by M. Fauvel, to whom I sent specimens, together with one other species given farther on. Ten or twelve specimens were taken by me on an old board fence one still and sunny day in autumn, 9th Nov., 1884. They were flying in the air, often alighting on the weather-beaten boards; and being quite small and dark-colored, one would occasionally be detected only by the lustre of its wings in the sunlight. In the evening of the following day I took a specimen, which I think is the same species, running over my papers as I was writing by lamp-light.

Quedius vernix Lec. This fine species is entirely of a highly burnished jet black. I took two specimens 9th Nov., 1884, under the soft, completely rotted remains of an old log in the woods. Both specimens lay perfectly motionless when they were disturbed, looking as though they were dead, but I recognized them, although they were black amongst black.

Philonthus brunneus Grav. I do not remember the conditions under which the original specimens were found; but they were probably taken in decaying fungus. One specimen, which I am quite sure belongs to this species, I took 8th Oct., 1884, in the same pieces of decaying fungus with *Falagria dissecta* Er.

Philonthus microphthalums Horn. This is a rather small species, and was also taken 8th Oct., 1884, with *Falagria*. Several specimens were found in the decaying pieces of fungus.

Philonthus baltimorensis Grav. This very pretty species, with polished black head and thorax and reddish elytra and abdomen, is oc-

casionally taken flying in summer and autumn, as are so many of the *Staphylinidæ*.

Philonthus apicalis Say. This is a very fine species, of a shining black with the tip of the abdomen dark reddish. Two specimens alighted on my clothes in the woods 19th Oct., 1884; and while endeavoring to capture one, it emitted on my fingers a clear liquid having a strong smell which I cannot describe better than by saying that it was like a mixture of wintergreen and fungus essence. The odor lasted for some time, but in some unaccountable manner the Staphylinid disappeared. An hour or so afterward, in another part of the woods, a second specimen alighted on me, and this time I was more successful and captured it. It emitted the very same scent, and in this specimen it seemed to me that the scent was in the form of an essence or oil all over the body; as I could not find that the insect emitted it visibly, yet my fingers would be touched with it wherever I touched the insect. It was probably emitted as a clear liquid at first from the extremity of the abdomen, and afterward got over the body.

Xantholinus cephalus Say. This specimen I have elsewhere given as taken in one instance under the bark of a dead trunk of basswood in Oct.

Cryptobium bicolor Grav. One taken on my clothes 2nd Oct., and another under a stone 8th Oct., 1884.

Paederus littorarius Grav. This species I have taken in colonies in passages under the bark of dead stumps in Feb., and under dry rotten wood in Oct.

Boletobius exoletus Er. This is the other species kindly determined for me by M. Fauvel. It does not seem to be given in our lists. M. Fauvel writes me: "Le No. 2 est *Bolitobius exoletus* Er. *(trinotatus* Horn nec Er.)" It is given in Fowler and Matthews' Cat. of Brit. Coleopt. (as is also *trinotatus* Er.), and is consequently found in England. I took one specimen of this very pretty species 26th Aug., 1885, in a decaying "toad-stool" fungus.

Olophrum obtectum Er. The nomenclature of the U. S. species of this genus was formerly very mixed, but is straightened out satisfactorily now; *marginatum* Makl. is now a synonym of *marginatum* Kirby, and *convexicolle* Lec. of *rotundicolle* Sahlb., while *rotundicolle* Say and *emarginatum* Say are synonyms of *obtectum* Er., the name now adopted for the species under consideration. Two specimens were taken 8th Oct., 1884, in the decaying pieces of fungus with *Falagria*.

I might mention that all the above genera are found in Europe; all

except the last two (and very probably they also occur) are given by Sharp from the Amazon region in South America (Sharp, Staphylinidæ of the Amazon, Trans. London Ent. Soc., 1876, Parts I. and II., May and June), while *Philonthus* and *Xantholinus* are found also in New Zealand.

NATURAL HISTORY NOTES ON CERTAIN COLEOPTERA.

No. I.

BY JOHN HAMILTON, M. D., ALLEGHENNY, PA.

Ceophyllus monilis Lec. Several of these curious little coleopters were taken May 11th, from a colony of ants inhabiting under a flat stone. This ant is honey yellow, .18 inch in length, very sluggish in its movements, and not disposed to be vicious; it seems to be the same as that with which *Batrisus bistriatus* is found (also in May), and is perhaps *Lasius integerrimus*, Mayr., which Mr. E. A. Schwarz thinks is the name of the ant with which on several occasions he found the same beetle in Michigan in early spring.

The beetles were on the under side of the stone distributed among the ants, and taking alarm immediately on its being overturned, scampered off so quickly into the underground galleries that only a few could be captured.

Dr. Leconte founded the genus on a single specimen taken in Michigan, in August, under the bark of the American linden; his specimen was only .11 inch in length, while these measure .16; otherwise his description applies, or from the different habitat another species might be inferred. Does *C. monilis* desert the ants in the spring to breed beneath bark during the summer and its offspring resort to the habitations of these ants to spend the winter? It is on many lists, but, except in the instance mentioned, has any one taken it elsewhere than with these insects? There are a considerable number of beetles found in friendly association with ants, especially in the spring, many of which are not recorded as having been observed elsewhere; but where their larval lives are spent is something entirely unknown. Some of them, in the spring, leave their friends, like *Cremastochilus canaliculatus*, which may be observed from May till August alighting during the hottest sunshine on warm stones and dusty roads; but whether all likewise leave is uncertain. The suggestion

is made to those finding ants-nest-beetles to mount an ant with each, as it will add much to the interest and value of the collection.

Eleusis pallidus Lec., seems to be rare. The specimens from which Dr. Leconte described the species were found in ants' nests; but their occurrence there was probably accidental, as their exceedingly thin, depressed form indicates a subcortical rather than a subterranean habitus. This summer I took a colony of over twenty under the decomposing bark of a Balm of Gilead *(Populus candicans)*, a near ally of the western cotton tree, under the bark of which another species, *E. fasciatus*, is found abundantly.

Cercus pennatus Murr., may be taken plentifully about the second week in May, on the blossoms of the Red Elder *(Sambucus pubens)*, and is seldom seen after it is out of bloom. It is mostly found on bushes growing in or near marshy places, those on dry situations yielding but few examples; and from this it may be properly inferred that the larvæ require a humid soil for their habitation. In the synoptic table in Dr. Horn's revision, the club of the antennæ is said to be bi-articulate; this, however, does not appear to be a very constant character, as the difference in size between the ninth and tenth joint is in many specimens scarcely appreciable, especially in the males.

Cucujus clavipes Fab. The very depressed form of this well known beetle indicates, *a priori*, its subcortical habit, and no other has power to adapt its tastes to a greater variety of timber—locust, maple, oak, hickory, gum, buckeye, &c., are all alike to it. The larvæ do not eat the wood nor the bark, living apparently on the moisture existing between the two. They are elongate, much depressed, brownish yellow, and scarcely to be distinguished from those of *Dendroides canadensis*. Some time in September, the larva having matured, constructs a circular cell from small particles of the decaying bark and wood, and in this completes its transformations before severe frost, but the beetle does not quit the cell till the following spring. I have never known any of these insects to be taken elsewhere than under bark, though they undoubtedly fly, being possessed of a good pair of wings. On the 10th of October, 15 newly disclosed individuals and several pupae were taken under the bark of a gum log; the latter are depressed like the beetle, pale at first, the eyes, antennae and portions of the legs gradually changing to black, and the elytra becoming red after disclosure. This insect is annual.

Elater militaris Harr. is as rare as the preceding is common, though

it may eventually be discovered to be much more plentiful than heretofore, since collectors have been furnished with the data for its recognition by the publication of Dr. Leconte's Synopsis of the genus (Trans. Am. Ent. Soc., vol. 12). Till now it has been among a set of unfortunate beetles, with names in the catalogues and descriptions accessible to few. It may readily be confounded with *E. linteus*, with which it is found, specimens of which occur with the apical black of the elytra more or less obsolete; but it may always be distinguished by the epipleura being entirely black, whereas in *linteus* the anterior half is conspicuously pale. The elytra are yellower than in *linteus*, with the external and sutural margins narrowly black and a little cloudiness at the apex in one of my two specimens. The antennae, besides having the second and third joints rounded and equal, scarcely exceed in length the thorax in the male, while in the female they are one third shorter. Nine specimens that I have seen have the foregoing characteristics.

Elasmocerus terminatus Say, was obtained in large numbers from a box of dead grape vines in May and June. These grape vines also yielded a multitude of *Phymatodes amoenus*, some *Neoclytus erythrocephalus*, *Chariessa pilosa*, *Tenebrioides corticalis*, besides other smaller species. The *P. amoenus*, which had nearly pulverized the vines, had mostly emerged before *E. terminatus* appeared. On splitting the vine several of its pupae were found in galleries excavated by the larvae themselves; these were from four to six inches in length; the distal end was packed with coarse fibre after the manner of the Cerambycans, and the other, towards which lay the head, with fine dust, leaving about an inch of vacancy for the pupa. These, like the perfect insects, vary from .25 to .50 inch in length. They are cylindrical, the abdomen smooth without projections or hooks, and having a greater diameter than the parts anterior; color entirely pale, the emargination of the eyes and tip of the abdomen first become dark, then the legs and wing pads; next the pupa skin is cast, and in three or four days the head and thorax have also changed to dark and the abdomen to red, and then the perfect insect comes forth in quest of flowers and a mate, the time occupied in the transformation having been from ten to fourteen days.

The vines contained the larvæ of several species, but which produced this beetle was not certainly ascertained, though I strongly suspect it to have been one that was round, six-footed, .25 to .50 inch. in length, white with a very small retractile black head armed with short, strong mandi-

bles; the legs stout, with one claw; the pro-legs well developed; the segments gradually tapering from the seventh to the head, the others not varying much in diameter, except the last, which is tapering and terminated with two short black hooks; the body has a few long stiff hairs. These larvæ were taken in the act of excavating galleries similar to the ones in which the pupæ of *E. terminatus* were found.

Whether the larvæ are carnivorous is unknown, but they are certainly lignivorous, as the work of their burrows shows. The Cleridæ are said to be parasitic in the larva state, but this species looks like an exception, as that much misapplied term is scarcely elastic enough to embrace a larva that is at the most only carnivorous.

Xanthonia villosula Mels. Two forms at least are recognized in this species. The first is the typical, entirely brownish rufous, and usually taken on oak, especially white oak, in June and July; it is so abundant and well known as to require no further notice. The other is slightly larger, with the thorax a little less convex and more coarsely punctured; the under sides except the legs are black; the antennae, mouth parts and feet are always yellowish; the head, thorax and elytra vary from ferruginous through all degrees of cloudiness to deep black. Like the other form, in life they are densely coated with an amorphous white powder that gives them the appearance of having been dusted with flour, and is so fugitive as to be only imperfectly preserved by the most careful handling possible. This form appears to feed on hazel alone, though it may be taken on any bush in its vicinity. While perhaps not separable from the first form by any constant structural characters, yet for the benefit of collectors it might be well that it should as a color variety have a name.

When color variations are in any way constant, they are as necessary in a complete cabinet as typical forms, and might be named and catalogued with great advantage to collectors and no detriment to science.

Nemognatha nemorensis Hentz. This beetle has a wide range, extending from the Atlantic to Colorado. It is probably not so rare as it seems to be, owing perhaps to the character of its food plant and its apparent resemblance to certain common and undesirable species of Lampyridæ, both of which may cause it to be readily overlooked. I find it abundantly throughout July on two species of Rudbeckia growing in meadows bordered with woods (*R. speciosa* and *R. hirta*), which rarely yield any Coleoptera except *Acmæodera pulchella*. The insects belonging to this genus and the next (*Gnathium*) are remarkable for having the

outer lobe of the maxillae greatly elongated, being in some species equal to the length of the body, and very slender. As seen in the cabinet these lobes are widely separated, but in life they are closely approximated, forming a single nematoid appendage. In the present species this arrangement is admirably adapted to the character of the flowers on which they feed ; the florets of the Rudbeckias being very long and very compactly inserted on the disk, to reach the nectaries at their bases, just such an armature is required. The lobes of the maxillae are inserted closed and do not embrace the florets nor open and shut in feeding, but are moved up and down like a drill, the needle shifting around among the florets without being withdrawn ; but in what way the nourishment is conveyed to the mouth I could not ascertain.

The species of this genus are numerous west of the Mississippi, and it would be interesting to learn what species of flowers they frequent.

NOTE ON ORYSSUS SAYI.

BY W. HAGUE HARRINGTON, OTTAWA.

The members of the genus Oryssus are apparently rare in Canada, and I was therefore much pleased to capture on the 2nd June a fine ♀ *O. Sayi*. It was running up and down a telegraph pole (one of the new ones put up for the electric light wires), and had at first glance all the appearance of some small wasp (Crabronidæ), searching for a suitable hole for its nest. Its movements were very quick, and its antennæ vibrated rapidly. It was so alert and restless that my prospects of capturing it without a net seemed far from bright. However, the capture was made, and its struggles in my cyanide bottle were brief. A few days later I took a ♂ upon one of the same poles, although in a different part of the city, and saw what appeared to be another of these insects fly away from higher up the pole. On the 24th I secured another female, which was even more active than the first, and which flew away and returned to the same place twice before I effected its capture. This habit of flying away when disturbed and of returning, even from some distance, to the very spot left, is one which I have noticed in other species of Uroceridæ. The poles upon which the above specimens were taken are cedar, and it is more than probable that the insects had emerged from the poles, as many had very numerous holes in them, apparently of Uroceridæ as well as of Coleoptera.

ADDITIONS TO THE LIST OF CANADIAN LEPIDOPTERA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

But little attention seems to have been given to Micro-Lepidoptera by Canadian collectors hitherto, so far as can be gathered from the printed lists, 83 names being all that could be reached when the latest one was published. It is certainly not for want of an abundance of material to work upon. I turned my attention to them specially last summer, and was quite surprised to find that so many different species could be obtained when sought for, considering that the season was a most unfavorable one for collecting generally, and no doubt affected them similarly. Mr. Fernald has kindly named the following 33 species for me, which I had in duplicate :

1. Scoparia libella, Grote.
2. Botis terrealis, Fr.
3. " venalis, Gr.
4. Cataclysta fulicalis, Clem.
5. Paraponyx plenilinealis, Gr.
6. Homophysa albolineata, G.-R.
7. Ephestia interpunctella, Hub.
8. Crambus sericinellus, Zell.
9. " alboclavellus, Schl., var.
10. " topiarius, Zell.
11. " elegans, Clem.
12. " vulgivagellus, Clem.
13. Schoenobius longirostrellus, Cl.
14. Cryptolechia tentoriferella, Cl.
15. Epigraphia eruditella, Gr.
16. Pandennis lamprosana, Robs.
17. Lophoderus politana, Haw.
18. Œnectra xanthoides, Walk.
19. Amphisa discopunctana, Clem.
20. Conchylis straminoides, Gr.
21. Eccopsis permundana, Clem.
22. " concinnana, Clem.
23. " inornatana, Clem.
24. " Footiana, Fern.
25. Penthina hebesana, Walk.
26. Sericoris agilana, Clem.
27. Paedisca transmissana, Walk.
28. " Scudderiana, Clem.
29. Semasia formosana, Clem.
30. Steganoptycha nubeculana, Fern. MSS.
31. Phoxopteris nubeculana, Clem.
32. Chimabacche haustellata, Wlsm.
33. Gelechia roseosuffusella, Clem.

There were several which I sent to him besides, that were new to him or unnamed in his collection. Of these 33, four are in the Canadian list Nos. 3, 4, 12 and 21. No. 4 is in the Society's collection as *C. annulalis* Walk., which Mr. Fernald informs me is a South American species, and 21 is probably the *Grapholitha permundana* of the Society's list. The conditions must be particularly favorable for the development of No. 4 at

Ridgeway, I would suppose from the multitudes of them I saw there last summer. I found them amongst some walnut trees which were growing by the lake shore, on the line where the barren sand of the beach joined the vegetation of the field, and when the lower branches or grass was disturbed, they would rise in clouds. I have now in my collection 108 named species; of these 58 have printed labels, leaving 25 labels yet unoccupied by me, and giving me 50 names new to the Canadian list, and I have 76 single specimens besides yet undetermined.

TENTHREDO (?) DELTA, PROV.

BY W. HAGUE HARRINGTON, OTTAWA.

Among the Tenthredinidæ captured by me during the past season was a good series of *Tenthredo delta* Prov, consisting of 12 females and 26 males. In pinning them I was frequently struck by the evident irregularity of the venation of the wings, and on a more careful examination of the specimens I find these irregularities to be both numerous and remarkable. No other species represented in my cabinet show any such divergencies from the typical form, except in rare instances. Provancher describes the female (page 210, "Petite Faune Entomologique du Canada") as having *two* discoidal cells in under wings, and Cresson ("Trans. Am. Ent. Soc.," vol. viii., page 44) as having *one or two* middle cells. *One* middle cell appears to be the rule, and any deviation therefrom to be an exception. Of my 12 specimens, 10 have *one* middle cell each, one has *two* middle cells, and the other *none*. The males are more uniform apparently in their venation, as none of my 26 specimens have middle cells in the under wings, thus agreeing with the description given by Cresson (loc. cit). Apart from the varying number of middle cells, the under wing of the females have the cells varying much in shape, especially the middle one, which ranges from a small triangular form to a large four-sided (square or irregular) one. There are also occasionally small additional cells on the posterior margin.

The most interesting variations are, however, to be observed in the anterior wings, and in this respect both sexes are nearly on a par; a female with *three* marginal cells is offset by a ♂ with but *one*. The former has both wings symmetrical as regards the additional marginal cell, and in

having the outer submarginal partly divided, while in the second the right wing shows a portion of the cross-nervure, which is totally wanting in the left. A rudimentary, or incomplete, cross-nervure in the outer submarginal cell occurs in several specimens, and in one ♂ the third submarginal nervure is continued half-way across the cell below. Another male has the third submarginal cell divided into two cells by a cross-nervure, which nearly coincides with the second recurrent. The left wing of one specimen has the third submarginal nervure forked at the anterior end, so as to form a minute triangular areolet, which, on the opposite wing, is almost square, and gives from the lower outer corner a branch partly across the cell. The outer submarginal cell is also in one instance partly divided longitudinally by a branch from the centre of the third submarginal nervure. The consideration of variations such as these specimens afford will indicate one of the difficulties which may attend the determination of a species (especially in the case of single insects) from descriptions, and the possibility of its being placed in a wrong genus and confounded with some species resembling it in color and markings. In a species whose wing-venation is evidently so unstable as that of the present insect, the specimens with additional complete or rudimentary cells appear to be reversions toward an earlier type, in which the wing-cells were more numerous. Another point in regard to the wings of this species is that the outer cells of the under wings of the male (in all my specimens) are closed, as in several of our species of Strongylogaster. This fact is not mentioned in the descriptions before quoted, and seems to me sufficient reason to question the propriety of placing the species in Tenthredo, from the members of which genus it also differs in general appearance, and to suggest the advisability of including it for the present in Strongylogaster. From the first tribe of this genus (as divided by Cresson) it seems to differ chiefly in having the lanceolate cell with a short, straight cross-line, instead of an oblique one. That its true position in the family is somewhat uncertain is evident from the fact that it was originally described as a species of Pachyprotasis, a genus much further removed from Tenthredo than is Strongylogaster. My specimens were all taken in the same locality—a swampy meadow margin, luxuriant in ferns, herbaceous plants and shrubs. The majority of them were taken during June and July.

THE ENTOMOLOGY OF VANCOUVER ISLAND.

NOTES ON SEVENTY-SIX SPECIES OF CICINDELIDÆ AND CARABIDÆ COLLECTED NEAR VICTORIA, VANCOUVER ISLAND.

BY GEORGE W. TAYLOR, VICTORIA, B. C.

The beetles enumerated below were all taken by myself in the neighbourhood of Victoria, Vancouver Island, during the past few seasons. Some of the larger species, especially the Colosomas, were captured under heaps of rubbish in my garden. The species of Omus and Cychrus and many others were found while searching for land shells under oak logs in the woods. Very many kinds too were found under stones, also during search for shells, while most of the rarer kinds were taken, accidentally I might say, while flying in the sunshine.

The number of specimens of Carabidae that could be collected here is very large, individuals being in fact far more numerous than I have ever seen them anywhere else, and I feel confident that a season's careful working would almost double my present list of species.

A large number (40 out of 78) of those I now record are new to the Canadian fauna, that is, as far as my knowledge of the same (which is based upon the Toronto Check List) goes, and some of these additions are very interesting ones.

The correctness of the determinations is, I think, beyond question, all the types (except in the case of eleven species) having passed through the hands of Mr. Ulke, of New York, who has been most kind and obliging in this matter. The remaining eleven species have been named for me by Dr. Horn, through the kind mediation of Mr. W. H. Harrington, of Ottawa. I have added to the list two species taken on the mainland of British Columbia by Mr. James Fletcher (of Ottawa) in 1883, and very generously given to me.

CICINDELIDÆ.

1. *Cicindela vulgaris* Say, var. Not uncommon, but much less frequent than the next species.
2. *Cicindela 12-guttata* Dej. The variety *Oregona* Lec. is the form occurring here. It is very common indeed, especially by the seaside. I have another species of Cicindela not yet identified.

CARABIDÆ.

3. *Elaphrus Clairvillei* Kirby. One specimen only, on 20th August, 1882, near the margin of Green Mountain Swamp (Victoria). I have searched the locality on several other occasions, but have failed so far to procure another specimen.
4. *Elaphrus riparius* Linn. This widely distributed species is very abundant here.
5. *Loricera 10-punctata* Esch. Several specimens on different occasions, generally flying in the middle of the day.
6. *Notiophilus sylvaticus* Esch. Not common.
7. " *nitens* Lec. Two only. A third species of Notiophilus is at present undetermined.
8. *Nebria virescens* Chaud. Several at different times.
9. " *Mannerheimii* Fisch. A pair under seaweed on the beach.
10. *Leistus ferruginosus* Mann. Not rare.
11. *Calosoma tepidum* Lec. Not uncommon ; very variable in size.
12. " *calidum* Fab. Several specimens of this fine beetle last spring. I have also three or four Calosomas which seem different from my type of *calidum*, but I have not yet submitted them to any authority.
13. *Carabus taedatus* Fischer. Common under logs, etc. A few days ago I secured 20 or 30 in some holes that had been dug the day before for fencing posts.
14. *Cychrus marginatus* Dej. Quite the commonest of our large Carabidae.
15. *Cychrus angusticollis* Fischer. Not so common as *marginatus*, but by no means rare.
16. *Omus Dejeani* Reiche. Very common under logs, and often to be seen wandering over the roads, I suppose in search of prey.
17. *Omus Audouini* Reiche. Not uncommon.
18. *Promecognathus crassus* Lec. I took a couple under a stone in 1882, and this season I have seen two or three more.
19. *Dyschirius patruelis* Lec. One specimen only. I have this year taken a considerable number of a species a little larger than this, but in other respects very similar. They were found running over the sands at Cadboro' Bay.
20. *Dromius piceus* Dej., var. *quadricollis* Lec. Several.
21. *Blechrus lucidus* Lec. Very common under logs and stones.

22. *Cymindis cribricollis* Dej. One specimen only, 26th March, 1882.
23. *Calathus Behrensii* Mann. Very common near Victoria.
24. *Platynus brunneomarginatus* Mann.
25. " *quadratus* Lec.
26. " *subsericeus* Lec.
27. " *sordens* Kirby.
28. *Platynus Californicus* Dej.
29. " *corvus* Lec.
30. " *fossiger* Dej.
31. " *octocolus* Mann. = *quadripunctatus* Dej.

Of the above species of Platynus, *subsericeus* is very abundant under stones, *brunneomarginatus* is common in and under rotten logs, and *corvus* is fairly common. All the others are represented in my collection by single specimens, principally captured while flying in the sunshine.

32. *Pterostichus orinomum* Leach. Common.
33. " *lucublandus* Say. Not rare.
34. " *amethystinus* Dej. Very common.
35. " *validus* Dej. Very common.
36. " *lustrans* Lec. A large variety ; rare.
37. " *herculaneus* Mann. Not common.
38. " *crenicollis* Lec. Common under logs on the banks of the River Colquitz, in one locality about five miles from Victoria.
39. *Poecilus cursitor* Lec. One only.
40. *Holciophorus ater* Dej. Not uncommon in rotten logs. This is the largest species of the order that I have yet taken here. It quickly destroys any other beetles that may be placed in the same box with it, though it does not appear to be nearly so savage an insect as are our two species of Omus.
41. *Amara subaenea* Lec. Not common.
42. " sp. A small species somewhat resembling *erratica*, but much smaller. It was returned by Mr. Ulke without a name, and is therefore presumably a new species.
43. *Amara littoralis* Zimm. Rare as far as I have observed, but probably commoner in suitable places.
44. *Amara laevipennis* Kirby. Not uncommon.
45. " *Californica* Dej. Rare.
46. " *fallax* Lec. Not common.
47. " *obesa* Say. Rare.
48. " *melanogastrica* Dej. Common.
49. " *erratica* Sturm. Common.

50. *Chlaenius interruptus* Horn. Not very uncommon in damp localities.
51. " *harpalinus* Esch. " " " "
52. *Anisodactylus viridescens* Lec. Not rare; color variable.
53. " *semipunctatus* Lec. Common.
54. " *piceus* Meretr. Common.
55. " *Californicus* Dej. Common.
56. *Bradycellus nigrinus* Dej. Not rare.
57. " *Californicus* Lec. Not rare.
58. *Harpalus cautus* Dej. Very common.
59. " *rufimanus* Lec. Very common, less so than the other two.
60. " *somnolentus* Dej. Very common.
61. *Stenolophus conjunctus* Say. Common.
62. " *limbalis*, Lec. Common.
63. " sp. "Not named yet"—Ulke. Common.
64. *Patrobus fossifrons* Dej. Not uncommon under logs.
65. *Bembidium mutatum* Gemm.
66. " sp. A.
67. " sp. B.
68. " *erasum* Lec.
69. " *incrematum* Lec.
70. " *iridescens* Lec.
71. *Bembidium nigripes* Kirby.
72. " *connivens* Lec.
73. " *versicolor* Lec.
74. " *sulcatum* Lec.
75. " *conspersum* Chd.
76. " *paludosum* Sturm. var. *lacustre*.

All these species of Bembidium seem to be common except *paludosum*, of which species I have only taken one specimen, and I cannot recall the precise locality. Of the two unnamed species, Mr. Ulke informed me that he had specimens from other localities, but they were not yet described.

The species determined for me by Dr. Horn are as follows: Nos. 1, 6, 9, 12, 23, 73, 74, 75, 76; and the two under-mentioned species, which are the ones alluded to at the commencement of this paper as having been taken on the mainland of B. C. by Mr. Fletcher.

Cicindela imperfecta Lec.
Opisthius Richardsoni Kirby.

NOTE ON AN INJURIOUS SAW-FLY LARVA.

BY THE REV. THOS. W. FYLES, SOUTH QUEBEC.

Length of larva, one and one-eighth inches ; breadth at widest part, three-sixteenths of an inch. The body flattened beneath, and slightly rounded above. It is scalloped along the sides. The legs proper are long and projecting. The creature has the habit of twisting the last four or five segments to one side. When disturbed it throws itself into the usual attitude of a Nematus larva. Its general color is yellow—the head has an orange tinge. There are ten rows of black spots on the body—six rows along the back, one row on each side, and two rows underneath. The spots of the side rows are longer than the rest, and are placed one on the fore part of each scallop. In each of the rows on the back the spots run three to a segment. The last segment has no spots. The eyes of the larva are black, and the mandibles are brown. The creature forms a rather loose, white cocoon.

Swarms or this kind of larva fed on the white birch, in the neighborhood of Quebec, during the month of September. They have all now gone into the cocoon stage.

NOTES ON TENTHREDINIDÆ, 1885.

BY W. HAGUE HARRINGTON, OTTAWA.

Read at the Annual Meeting of the Ent. Soc. Ont.

The earliest species which I noted during the past season, was the common and obnoxious currant saw-fly, *Nematus ventricosus*, which appeared on 15th May. Two days later I captured upon willow in bloom a specimen of *Dolerus collaris*, and on the 21st and 22nd found *D. aprilis* quite common on and about alders, with a few *D. sericeus ?* and *D. abdominalis*. By the 24th May the strawberry saw-fly, *Emphytus maculatus*, and the raspberry saw-fly, *Selandria rubi*, were in considerable numbers, and at the same time appeared several less well known species in fields and woods, such as *Hylotoma McCleayi*. This species I found again on 2nd June and subsequent days, upon the flowers of choke-cherry. Later in the season specimens were found upon Spiræa. *Selandria flavipes* was captured on 10th June, and was abundant during the season. It

could always be obtained by using a sweeping-net among the common fern. At the same time could be obtained in abundance upon the ferns greenish larvae which I have no doubt were those of that species. These larvae when full grown are about two-thirds of an inch long. The body is finely transversely wrinkled; bright green above and whitish below. The head has a brown patch on vertex and behind the eyes, which is reduced in some specimens to two dots on vertex and one behind each eye. By the middle of June the species were numerous, including *Tenthredo verticalis*, *T. rufopectus*, *M. flavicoxæ*, *Pœcilostoma albosectus*, this rare insect being taken on 13th; and *Tenthredo* (?) *delta*, of which seven ♂ were taken on 16th. Hickories suffered considerably during the latter part of the month from the larvae which I think to be those of *Acordulecera dorsalis*. They are one-third of an inch long. The body is whitish, with green dorsal stripe, is slightly pubescent and has the lateral margins dilated. The head is black and the thoracic feet are whitish. The abdominal feet are very minute. On the 24th I found several colonies of *Nematus Erichsonii* on larches not far from the line of the Canada Atlantic Ry., along which route the fly appears to have reached Ottawa. These I destroyed, with the exception of one brood, which I took home and which commenced to spin their cocoons on 2nd July. Two or three days later I found a few other broods of small larvae, and twigs bearing eggs which were also destroyed. On subsequent visits I found no further traces, and hope that I have checked the increase of the species in that locality for another year. On the 27th June I found cedars at Hull greatly infested with the larvae of an undetermined saw-fly. I have mislaid a description of these larvae and have only the following brief note of four specimens taken the previous August: "Yellowish green, with darker undefined dorsal and lateral stripes; black thoracic feet, eight pair abdominal feet, head ferrugineous, length 15 m." It seems to be the species mentioned by Packard on page 257 "Insects Injurious to Forest and Shade Trees," as *Lophyrus abietis*, but the larvae differ somewhat in color from those of that species taken upon spruce. I have always found the larvae of *Lophyrus abietis* captured on spruce comparatively easy to rear, but with those from the cedar I was unsuccessful. When placed in the breeding-jar, they left their food and clustered upon the side, and would only feed when the jar was wrapped up or placed in the dark, and they gradually died before spinning their cocoons. The larvae of *N. similaris*, the locust saw-fly, were common during the summer. An imago

was seen on 24th June, and a larva taken the same day spun its cocoon on the 30th. On 1st July, I noticed a young ash in front of a neighbor's house with its leaves badly eaten. It immediately struck me that this might be the action of larvae of *Selandria barda*, and on examination I found upon the under side of the leaves a number of large whitish larvae corresponding to those described by Mr. Osborn (CAN. ENT., vol. xvi., page 150). They fed a few days longer and then went into the earth. During July larvae of various species were very plentiful, and in some instances the plants attacked by them were much defoliated. The flies were also abundant and many species were captured, such as *T. verticalis*, *T. ventralis*, *T. basilaris*, *H. trisyllaba*, and *Emphytus tarsatus;* the last is a large handsome insect resembling superficially the members of the genus *Tenthredo*. In August saw-flies diminished in numbers, but several species could still be obtained, and *Allantus basilaris* was, as usual, common on golden-rod, etc. About the middle of Sept. (12th?) a number of plants of turtle-head *(Chelone glabra)* were found infested by the larvae of some unknown species. These, unlike the majority of saw-fly larvae, were very pretty caterpillars, mottled, or marbled, with velvety black and white, and with jet black heads. The same species has been found by me in July feeding upon meadow-rue *(Thalictrum cornuti)*, but I have not succeeded in breeding it. A few larvae of other species were seen up to the first of October, but the repeated sharp frosts apparently caused them to disappear. My captures of saw-flies during the season number altogether about 300 specimens, with perhaps one-fourth as many species. Of these many are rare insects, while several species are yet undetermined.

CHRYSOMELA ELEGANS, ROGERS.

Dear Sir: In the Society's report for 1882, Mr. W. H. Harrington states that he had found this species to be common at Ottawa, but had not discovered its food plant. I find *elegans* to be abundant in this neighborhood on Beggar Ticks, *Bidens frondosa* and *B. cernua*. There appears to be two broods, if not more, as I have found them plentiful in June and again in August and September; the beetles of the last brood evidently hybernate, as I have taken stray specimens in early spring. The food plant was kindly determined for me by Dr. J. B. McConnell.

F. B. CAULFIELD, Montreal, P. Q

The Canadian Entomologist.

VOL. XVIII. LONDON, MARCH, 1886. No. 3

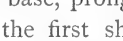
ON PHYSONOTA UNIPUNCTATA SAY, AND ITS SUPPOSED VARIETIES.

BY F. B. CAULFEILD, MONTREAL, P. Q.

As considerable doubt appears to exist with regard to the three species or races of *Physonota* described by Say, Randall, and Walsh and Riley, and as I had in former years found a species of this genus to be rather common in the vicinity of Montreal, I endeavored during the past season to find it again, and, as far as my opportunities would permit, work up its life history.

Early in May I made a careful search in the locality where I had previously found it, but at this date its food plant had not yet appeared above ground. I tried again in June, the time at which I had formerly taken the first brood. The food plant, *Helianthus decapetalus*, was now about two feet high, but the leaves were untouched, and to my great disappointment no beetles were found, as I particularly wished to ascertain the color of the early summer brood, as those which I had formerly taken at this season were of a bright gold color, quite different from those taken later in the year. This difference of color in the broods appears to me to point to the conclusion that *Physonota* may possess the power of assuming different tints, as is the case with some other species of the family. On August 15th I found a colony of the beetles on the same plant, now in full flower. The beetles were all in the autumnal dress, black and white, with testaceous margin. The species is undoubtedly that described by Walsh and Riley as *P. quinquepunctata*, which is, I think, a synonym of *helianthi* Randall. This author describes it as having the "elytra blackish, irregularly spotted with white, with a testaceous margin, losing its color after death, becoming nearly pale testaceous, except the three black spots on the thorax." This agrees very well with the species found by me, except that they have a double spot close to the anterior margin of the thorax, but as this fades soon after

death to olive green, and in old specimens becomes almost imperceptible, while the three posterior spots retain their color, the term *5-punctata* loses its significance. Indeed, on reading Dr. Hamilton's remarks on the species in the CANADIAN ENTOMOLOGST, I examined some specimens taken several years since, and came to the conclusion that they were Randall's species. The description given by Walsh and Riley, American Entomologist and Botanist, vol. 2, p. 4, has, I think, been taken from cabinet specimens, as they give it as "more or less pale dull olive color, dotted with pale yellow. *Thorax* with three black spots behind the middle. Before the middle black spot a double dark olive spot, composed of two trapezoidal spots transversely arranged, and not unfrequently more or less confluent with each other." I have taken the beetle abundantly last summer, and bred a number from the larva, and all mature specimens were pure black and white when living, but they fade soon after death, when they answer to the description given by Walsh and Riley, but in time the anterior spot almost entirely disappears. This double spot appears to be the only difference between *helianthi* and *5-punctata*, and may perhaps have been overlooked by Randall; there may, however, be a form with only three spots on the thorax, as described by him. All taken by me had the double spot, but in many it was confluent.

I found the beetles to be very sluggish, none being observed moving about or feeding. Although living in communities, but one beetle was generally found on a leaf, and they appeared to prefer the leaves situated near the head of the plant. Along with the beetles I found a solitary larva, of which I took the following description: Body depressed, oblong oval. Length almost half an inch. General color dark olive green. Head black. Throax dull greenish yellow, lightest in front. Abdomen dark olive green, with three short yellow stripes on dorsal surface, the central stripe commencing nearest the thorax, thus,  . Tail bifurcate, yellowish green at base, prongs black. Lateral surface with a row of ten simple spines, the first short, black, the next three longer, black at base, central portion white, tip black, remaining spines short, black. Under surface pale olive green, terminal segments black. Legs pale olive green, feet black. When undisturbed this larva kept its tail curved over its back, but frequently altered the angle at which it was inclined. When disturbed it jerked the tail forward and downward until it nearly touched the body. Both body and tail were wet with semifluid excreta, and when thus covered, the prongs of the tail and the lateral

spines would be easily overlooked. When placed in a box it soon lost its wet coat, when the form and color could be distinctly seen. It fed freely until the 23rd of August, when it rested quietly on the bottom of the box. The tail was now extended straight behind the body, and the larva was clean and dry. At this time, if disturbed, it raised the tail slightly, but did not otherwise move. I examined it every day, but noticed no change, On looking at it on the morning of the 27th August, it had changed to a pupa. Length of pupa a little over a quarter of an inch. Form oval, sub-depressed. Thorax slightly wider than abdomen, margin of the thorax dilated. Disk of thorax with three black spots near posterior margin. A double green spot close to anterior margin, but not touching it. Dilated margin green; from the centre of the lateral margin a black line extends through the green a little way on the white. Posterior margin edged with a narrow line of black. Abdomen immediately behind thorax, green, centre white, remainder of abdomen pale yellow. A row of five black spots close to lateral margin, centre with three interrupted transverse black lines. Elytra green, spotted with pale yellow, sutural margin bordered with a narrow black line. Just behind the elytra, on the lateral margin of the abdomen, there is a slightly elevated, oblong, pale yellow spot, upon which is situated two very short white spines. On looking at it at noon on September 11th, the beetle had apparently just emerged, as the elytra were, with the exception of the white spots, pale green and semi-transparent. The wings were not yet folded, extending beyond the body. At 6 p. m. the elytra had become much darker and were but slightly transparent, and the wings were now folded beneath the elytra. On the 13th its colors were pure black and white. On the 24th of August I found a colony of eleven larvae, identical with the first one found, one beetle and one pupa. The latter was on a leaf which had been partly eaten by larvae; it was attached to the leaf by the posterior extremity, the larval skin being pushed behind and slightly beneath. It rested on the upper surface of the leaf, with the head pointing to the base of the leaf, and was partly concealed by the withered edges of the leaf, which were curled inwards. This was the only pupa found, although I searched carefully on several occasions, but as the food plant was abundant I may have overlooked them. *Physonota* may perhaps leave the food plant before transforming, but this would not be in accordance with the habit of allied species, which usually attach themselves to the under surface of a leaf. The specimens reared in confinement did not appear to be particular as to

situation, some pupating on the bottom of the box, others beneath the lid, while others again attached themselves to the side, in every instance producing a perfect beetle. The lot of larvae taken August 24th had all changed to pupa on September 8th. They began to emerge on September 17th, and were all out on September 20th.

On August 26th, I found a large colony of larvae and beetles. The larvae were of two sizes, some very small and others about full grown, but about the only noticeable difference, apart from size, was that in the young larvæ the yellow markings were scarcely to be seen. The small larvae had lately moulted, and the cast skins were on the leaves, showing that in this respect *Physonota* differs from *Coptocycla* and *Cassida*, the larvae of which slip the cast skins on the tail. Until nearly full grown, the larvae of *Physonota* are social, keeping together in compact groups, the heads in the centre, surrounded by a circle of uplifted tails, presenting a most curious appearance. When nearly full grown they separate and scatter over the plants. By most of the later writers on the insects in question, but one species is recognized, *P. unipunctata* Say. Prof. Riley, in the Supplement and Index to Missouri Reports, p. 53, says: "*Physonota quinquepunctata* Walsh & Riley (Rep. ii., p. 59).—This is synonymous with *Ph. unipunctata* (Say), there being no question as to the specific identity of the two, both having been bred by Mr. F. H. Chittenden, of Ithaca, N. Y., from larvae on wild sunflower (Helianthus)." That *P. quinquepunctata* W. & R. is synonymous with *P. helianthi* Rand., is I believe correct, but its identity with *P. unipunctata* Say is I think still an open question. With regard to this point Dr. Hamilton writes me: "But even if they were so bred, it does not prove identity, because (if species) both are found in the same vicinity, and may have mingled on the same plant. Besides it may have been *helianthi* instead of *unipunctata*, since both go by the same name."

The records of these species appear to me to point to the conclusion that they are distinct. Say describes his species as yellow, with the margin whitish. Dr. Hamilton, CAN. ENT., vol. xvi., p. 135, speaking of a colony of *unipunctata* found by him, states that all taken were of Say's type, pale above with *one* black spot on thorax. He also tells us that a few of the larvae were feeding with them, their colors bright yellow. As in all the *Cassidæ* the colors change after death, I wrote to Dr. Hamilton, asking him what the color of the specimens found by him was in life. In answer he informed me that all taken by him were entirely pale, except the black

thoracic spot. From these accounts it would appear that there is considerable difference between these forms, the larva and beetle of *unipunctata* being light in color, while *helianthi* is dark. With regard to food plants, so far as known *helianthi* is confined to sunflower *(Helianthus).* Randall says: "Many specimens of our species occurred at Farmington, near the margin of the Sandy River, on a species of *Helianthus;* a great many of these plants were almost wholly deprived of leaves by their ravages."

So far as I am aware, there is no authentic record of typical *unipunctata* having been observed feeding on *Helianthus. Unipunctata* was taken by Dr. Hamilton feeding on mint, *Monarda fistulosa.* He further informs us that they "must have fed on the *Monarda* from choice rather than necessity, because three species of *Helianthus* grew with it and were not eaten by either larva or beetle." Prof. Riley, American Entomologist and Botanist, vol. ii., p. 4, states that he has "observed the one-dotted Tortoise-beetle *(Physonota unipunctata* Say) feeding in the larval state upon a Sow-thistle *(Sonchus)."* Both forms seem to be widely distributed; Say records *unipunctata* from Missouri; Dr. Hamilton records it from Allegheny, Pa., but states that it had no doubt been brought from some more northern region during the annual spring inundation. *Helianthi* is recorded from Rock Island, Ill., by Walsh, or its var., *quinquepunctata.* Messrs. Hubbard & Schwarz record *unipunctata* from the lower peninsula of Michigan, but do not state which form was taken. Montreal is the only Canadian locality from which I find *Physonota* recorded. In D'Urban's list of Montreal Coleoptera (Canadian Naturalist, vol. 4, p. 307) he gives *Cassida unipunctata* as common on the Mountain. This probably would be *helianthi*, as I have found it common on Montreal Mountain, but have never met with a typical specimen of *unipunctata.*

I hope that entomologists will look out for these species during the coming season, and if successful, let the readers of the ENTOMOLOGIST have the benefit of their observations.

The food plant was kindly determined for me by Dr. J. B. McConnell.

NOTE ON XIPHYDRIA ALBICORNIS.

BY W. HAGUE HARRINGTON, OTTAWA.

This species was abundant from the middle of June to the end of July, and I observed the females ovipositing on our shade trees (maple)

in various parts of the city. It appears to prefer trees which have been recently transplanted, and which are naturally not so vigorous as those which grow undisturbed. My next-door neighbor set out several young trees, from one to two inches in diameter, and upon these I took several specimens. On the other hand, I observed them, beyond the city, ovipositing in quite large and old maples, and even upon the limbs of an old tree which had been broken and blown down. Thus, it appears, that the size of the tree does not make much difference to them, and that in the city they attack the smaller trees because they are less vigorous than those that have recovered from the effects of transplantation.

PROTECTIVE COLORATION IN THE GENUS CICINDELA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

In the summer of 1884, while collecting the green tiger-beetles in the woods, it struck me very forcibly how the Cicindelæ that inhabit such places—*sexguttata* Fab. here, *campestris* Linn. in England, others elsewhere—are for the most part of a beautiful green, so as to assimilate in color with the surrounding vegetation and herbage among which they may alight; while those that frequent the bare ground, banks, sand hills, sandy stretches, beaches, bars—*vulgaris* Say, *repanda* Dej., *maritima* Dej., and many others—are of the colors easily assimilative with those that surround them on the flats and stretches where they are found.

Although those of the class first referred to often alight upon bare ground, it is mostly at such places as have been cleared by man (I am speaking of *sexguttata* Fab. now, this being the only species of a conspicuous green that I have had the opportunity to observe in its native habitat), their original haunts being the fresh, green woods, where nearly everything is clothed in greenness in its natural state. There they can hardly be distinguished when they are alighted, even though on a log, for the dazzling greenness of the forest at the time these insects appear fastens that color upon the eye, so that for the moment they become invisible, though you may be looking directly at them—invisible, certainly, so far as recognition is related to invisibility; every collector knows that it takes practice to distinguish these insects in their native haunts. Even though the surrounding vegetation is sparse, the effect is the same. This arises

from the liability of the mind to class everything green in the woods as belonging to vegetation, or, in other words, from our inherent tendency to place animals or locomotive beings as different in color from plants. When, as is often the case, they are alighted on sandy banks in or near the woods, the effect is similar; the surrounding greenness makes them difficult of detection here, as well as in other spots, even away from woods, where they may be side by side with vegetation. The momentary invisibility which the insect therefore possesses gives it a chance to escape, if it chooses to make use of this chance. But as long as everything remains quiet it seldom flies, trusting rather for protection to its habit of remaining perfectly motionless, combined with its similarity in color with surroundings. In the natural state man is not its enemy, but its assimilative coloration probably protects it in a great degree from its many known enemies among the birds and reptiles.

A fine and rare English species, *germanica* Linn., which is said to frequent most a certain favored locality in the Isle of Wight (Black Gaug Chine), unlike most of the genus, prefers wet to dry places, and has a liking for brackish marshes.* It is of a beautiful rich green, and thus is enabled to escape observation amid the vegetation which thrives in such places.

Of the other class, our most common species, *vvlgaris* Say, is as nearly invisible as an insect can well become by assimilation in color with its surroundings. It is only the practiced eye that can distinguish it from the soil or sand upon which it alights; for, in either case, those parts of a different color from the surface upon which the insect is resting will be mistaken for particles of foreign matter, giving the eye no chance to rest upon form. I have often, before I became used to the practice, looked most carefully for a long time when I had distinctly seen a specimen of this species alight, but without being able to distinguish it until it moved.

A southern species, *tortuosa* Dej., which I have taken in Louisiana, has very little of the lighter markings upon it, but is nearly all of the sombre shade of the sandy mud flats over which it runs and flies.

A fine western species, which I have taken in Kansas on the sand-bars of the Kansas River, at Lawrence, during low water in the summer months, is *macra* Lec. In this the markings have united so as to form an etched border to the elytra of just the light color of the fine sand of

* Rye, British Beetles, p. 47-48.

the bars, so that it can hardly be detected where alighted, the darker parts being easily taken for bits of drift-wood or pebbles.

These notes being intended only as a mention of this interesting subject, I will not bring up any further species, for they will nearly all be found equally well adapted in this way to their surroundings. Species are to be found all over the world, many of which would furnish more interesting cases than the above. I might mention that I have lately received from New Zealand two fine species, *tuberculata*, Fabr., and *parryi*, White. In the former the markings have united, while in the latter they have become somewhat indistinct, the elytra having a very thin and delicate appearance, as indeed has the whole insect, leaving the markings not well defined. These species would be hard to detect alike in sandy places or on darker soils, though *tuberculata*, Fabr., is better adapted to the former, and *parryi*, White., to the latter.

Many of the species differ from others in the number of the elytral markings; but it is the base color that concerns us here, for it is this that makes the insects hard to discern from their natural surroundings, while the lighter markings help the effect. Thus those of the bright green woods have the base color of the same dazzling, brilliant green, while others have it of the duller color of the soils they frequent, or are considerable modified, as *macra*, Lec., and the nearly related *cuprascrus*, Lec., *puritana*, Horn, *wapleri*, Lec., and especially the two Mexican species figured by Schaupp, in his synopsis, * so as to have the markings unite, and, so far as the effect goes, take the place of the original background and themselves become the real base color, conforming more to the color of the white sand of the bars upon which they are found. It is noticeable that in all this variation the elytral markings, when they occur, keep the one creamy white color, however the base color may change. If the markings are united, becoming the base in effect, the other parts retain their dull color as before. In short, there is generally an irregular light edging to the insect, often broken, which gives it an irregular outline, so that it will not readily assume form. Had we never observed these species in their natural habitat, this alone would prove to us that they were terrestrial in their habits.

They do not take for ornament conspicuous colors upon conspicuous

* Schaupp, Synopsis of North America *Cicindelidæ*, Pl. III., figs. 85 and 86. (From Bull. Bkl. Ent. Soc., vol. VI.)

parts. The under parts are generally of a deep green or bluish, irrespective of the insect's habitat. These colors do not show from above. On this account many of the species seem to be more brightly colored beneath than above, except in such cases as afford the bright colors above a chance to assimilate with soils or foliage. Yet the upper parts are really the more richly colored in all the species, though they may not appear so to the causal eye. Here, in the coloration of the upper parts of the *Cicindelæ*, natural and sexual selection blend. They act together at the same time upon the same parts. While sexual selection produces beautiful tints, natural selection takes care that none remain that will endanger the insects preservation by making it conspicuous in its retreats. In this way colors, which otherwise would be prominent, assume a general dull appearance, which will not arrest the eye. Life is of primary value, but so also is beauty to the perpetuation of the insect. While the upper parts retain the colors that will assimilate well with their surroundings, sexual selection has given them tints, which though in many cases seemingly dull to the eyes of man, are found under a high lens to consist of the most lovely bronzed, purplish and dazzling green reflections, in the entirety of which beauty the insects appear to themselves by virtue of their far superior sight development.

LARVA OF SEIRODONTA BILINEATA, PACK.

BY G. H. FRENCH, CARBONDALE, ILL.

Length 1.20 inches ; cylindrical, rather slender, two warty elevations on the dorsum of joints 5 and 12, elsewhere the piliferous spots scarcely perceptible, except for the single hair that arises from each. Color green; a dorsal pale yellow line, bordered on each side on joints 3 and 4 by a purple line ; outside this a pale yellow stripe that diverges on joint 2, gradually diverging again on joints 4, 5 and 6, where it reaches below the usual region of the subdorsal line, extending from this back to joint 11, from which it gradually converges to the elevations on joint 12, touching these on the outside, the diverging and converging referring to the stripes on both sides of the body. These stripes send more or less prominent deflections down the sides of joints 7 and 10. In some examples the space between these stripes and the dorsal line contains a pale whitish stripe each side of the dorsal ; the deflections, and a little on joint 5 and

the elevations, are reddish purple. In other examples the whole space between the lines, except four or five greenish patches, is reddish purple, there being various intergrades. In all cases the purple is mottled. The sides are specked with purple; stigmatal line yellow with traces of one above this. Head with a dark purple line each side, outside of which is a yellowish line.

The larvæ from which this description was taken, 13 in all, were taken on a young elm tree September 29, 1884. By October 5th all but one had disappeared for the purpose of pupation, going beneath the surface of the dirt in the breeding cage. Nine imagines were produced the following spring, the times of emergence ranging from May 24th to June 7th. There seems to be two broods in a season, for larvæ were found on elms during the early part of summer, but these were not reared to find out the period of the summer brood.

NOTES ON PAPILIO TURNUS AND PYRAMEIS CARDUI.

BY MRS. C. H. FERNALD.

Previous to the summer of 1884, *Papilio turnus* and *Pyrameis cardui* had been quite rare in Orono, Me., and vicinity, not more than half a dozen of the former and two or three of the latter having been seen each year; but in June of that year *P. turnus* was so abundant that it was not uncommon to see a dozen or more flying together. In August of the same year fresh specimens of *P. cardui* were so abundant that in a small piece of red clover, not more than two rods from the house, I captured twenty-five in half an hour, and the numbers were not perceptibly diminished. The next day they were equally abundant, but the following day we had a cold rain storm, after which only a very few poor, faded examples were seen. The next summer (1885) *P. turnus* was again rare, and not one example of *P. cardui* was seen by myself, nor by any one in this vicinity. Parasites might have made the difference in the number of *P. turnus*, but could they have done so with that immense number of *P. cardui*, or did that storm so effectually destroy them before laying their eggs that there were none the next year, or is it possible that some epidemic attacked them, leaving none to perpetuate the race? We can understand the gradual increase and decrease of certain species which is noticeable every year, but the sudden abundance and scarcity of some

species is a subject of great interest, and one about which but very little is known at present.

I have in my possession a male *Papilio turnus* which has only two wings. An examination shows that the hind wings are undeveloped ; on one side the membrane is pushed out and rounded at the end about as large as the head of a pin, and on the other side the membrane is no longer, but is broader and somewhat flattened, showing plainly that the wings have not been broken off, but have never developed. This specimen was captured on the wing, while hovering over lilac blossoms, and appeared to fly as well as perfect specimens.

In the summer of 1884, I captured a male *Papilio turnus* which differs very much from any I have ever seen or read of. The outer half of the upper side of all the wings is black, except the row of yellow spots on the outer margin of the wings. These are round or nearly so, instead of elongated, and there are only six on the fore wings. The inner half of the fore wings is like the ordinary *P. turnus*, except that the two black streaks are united from the costa down about half their length. The under side of the fore wings is like the upper side, but slightly dusted with yellow. The under side of the hind wings has the blue extended nearly as far in as the black upon the outside, and, together with its black border, is very strongly curved or toothed towards the base. All the yellow on the wings is darker than on the common form, and the insect when flying looked more like a male *P. asterias*, except in size, than like a *P. turnus*.

It was captured in June on the bog where *Chionobas jutta*, *Chrysophanus epixanthe*, and several other rare lepidoptera are found.

NOTES ON CERESA BUBALUS, Say.

BY JOHN G. JACK, CHATEAUGUAY BASIN, QUE., CAN.

Read before the Montreal Branch Ent. Soc. of Ont., 9th Feb., 1886.

During the past two years, but more especially this season, we have been very much troubled and annoyed by the attacks of the Buffalo Tree-hopper (*C. bubalus* Say) on the young trees in the orchard. Most of the trees have been seriously injured by having the bark cut up by the ovipositors of these insects, when depositing their eggs. These incisions

and the eggs in them were so numerous that in many cases it was impossible to raise the bark for the purpose of "budding" the trees.

The incisions and eggs are usually most abundant on the south and the upper side of the limbs, comparatively few being found on the shady or under sides. The first imagines were noticed in the orchard on July 16th, and a few days later they became quite abundant. On the young tender twigs of the apple trees, especially those nearest to the ground, large numbers of the insects were found busily extracting the juices with their slender beaks. Upon close examination the twigs plainly showed the traces of their punctures. They were also very abundant on beans, potatoes and several kinds of weeds, in many cases completely covering the stems, and all engaged in feeding upon the juices of the plants. Bean-stalks that were attacked in this way were considerably injured, as numerous dark knotty formations occurred at the places that were much punctured, so that the growth of the plant was decidedly checked.

The insect was first noticed depositing eggs about August 12th, and a few incisions were then to be found on the branches. This depositing of eggs continued until Oct. 8th, when a severe frost killed a great many of the tree-hoppers, although a few escaped and continued the work until Oct. 26th. After that date they were not noted.

Some of the eggs of the season of 1884 were collected last spring and kept in a very tight box. They were hatched during the first week in June, and with them were a number of small Dipterous flies, evidently parasites upon the eggs of *Ceresa*. I watched for these parasites in the summer and autumn, and first found them August 31st, on limbs where the tree-hoppers were depositing eggs. The parasites were found in larger numbers a little later, and I had the satisfaction of distinctly seeing a number of them insert the abdomen and sometimes almost the entire body deeply into the gaping slits made by the ovipositors of the tree-hoppers. Prof. Riley thinks that the parasite may be an undescribed species.

As I did not know the best conditions or food for the young larvæ of *Ceresa*, I placed them in a glass jar and gave them the tender twigs and leaves of apple trees. From these they seemed to extract the juices, and they could be seen in rows on the ribs of the leaves, with extended beaks, while little particles of a clear gummy substance were often found at the places where the insects had been sucking the juices. I afterwards added bits of grasses, etc., to their food, but after some time they ceased feed-

ing, and finally they all died, none of them being more than half grown. This was about July 5th, and about this time I found a number of the larvæ about some raspberry canes in a shady place, and on July 13th I took more of them among low juicy grasses and thistles, growing thickly in a cool, moist place, several rods from any trees of any kind. On July 17th, nearly all these larvæ changed to the adult form.

The larva becomes much elongated as it begins to cast the last envelope, and one of them, noticed when just beginning the operation, took three hours to complete it.

The full grown larva is about 8 m.m. in length, and light green in color, somewhat lighter than that of the mature insect. The young larvæ appeared to be of a darker green than they were at a later period of their growth. The general shape is triangular, like that of the mature insect, but the broad horn-like projections are not seen in the larva. The eyes are prominent. On the front of the elevated thorax, and behind each eye, are two short, strong spines, one above the other, armed with several lateral prongs or forks; higher up, near the apex of the triangular shaped throax, are two more, somewhat larger armed spines, and the last two visible thoracic segments are each provided with a pair of these branching spines that are still longer. There is also a pair of these spines, each armed with about 6 or 7 barbs, on each of the abdominal segments next to the terminal. These are graduated in length, the shortest being on the last segments, and the longest hardly more than a millimeter in length. The thoracic spines project forwards, while those on the abdominal segments are drawn forward at the base and then curve back, strongly suggesting the dorsal fin of a fish. On the last segment, which is long and tapering, there are two short armed spines directly above the anal opening, which is terminal. The ventral surface of the abdomen is scatteringly covered with short, strong bristles or hairs. The legs are also covered with stiff hairs.

The eggs, in batches of from 5 or 6 to a dozen (rarely more), are deposited obliquely in the bark, and often the incision continues into the wood, if the bark is thin. In this way the bark and wood become fastened together, and will not separate at any season, and the dark spots in the wood and the rough knotty bark bear evidences of the injuries for many years.

The eggs are of a dirty transparent white, about 1.5 m.m. in length, smooth, slightly tapering, and sharply rounded towards the interior end,

but tapering much more gradually at the exterior end. Although normally round, the sides are generally found to be more or less flattened by pressure from the tissues of the wood and bark of the tree. So numerous were these eggs on some trees that a careful estimate shows that there must be at least from six to eight hundred eggs in a section of the branches not more than an inch long and half an inch in diameter.

I have not been able to find a remedy, and perhaps the best is to destroy as many of the egg-bearing limbs as possible. It is to be hoped that the little parasitic flies will increase, and this seems probable. On Sept. 17th I found 5 or 6 tree-hoppers ovipositing on a piece of branch about 4 inches long, and on the same section were 12 or 15 of the parasitic flies.

THE COLIAS CONTROVERSY.

BY R. H. STRETCH, SAN FRANCISCO.

It is to me a most distasteful task to take part publicly in the "Colias" controversy between Mr. Edwards and Dr. Hagen, as I was an invited guest of Dr. Hagen on the trip to Washington Territory, where the events took place which have given rise to the discussion; but in the interest of science, which seeks nothing but the truth, it seems as though the time had come when I ought to state in a concise manner what I know of the whole matter. I have been cut off from all my books for the last five months, while travelling from place to place, or this letter would have been written earlier. I did not know till quite recently the phase to which the controversy had arrived. Probably the best thing I can do is to state the manner in which our party was organized, and the manner in which our collecting was done.

The party consisted of Dr. Hagen, and his assistant, Samuel Henshaw. In San Francisco I was invited to join it, and did so.

Mr. Henshaw was a skillful coleopterist, a department of entomology of which I knew but little, so by mutual agreement I became practically the lepidopterist of the party, as he was the coleopterist, and we both collected such other groups of insects as came in our way. Purely scientific work, or mere collecting, was discouraged, as the party was an "Economic Entomological Expedition," a fact repeated over and over again to the wonder-stricken pioneers of the wilderness.

Our collecting appliances consisted of nets, envelopes, "cyanide" bottles and pill-boxes. Mr. Henshaw and myself each had a cyanide bottle. The collecting was practically done by Mr. Henshaw and myself, as Dr. Hagen was physically unable to enter into it, however much he might have wished to do so. Personally I collected everything in the "cyanide" bottle, *except* lepidoptera. These were transferred direct from the net to envelopes. Mr. Henshaw not only collected everything in the cyanide bottle, but not unfrequently placed his lepidoptera therein when he was out of envelopes, and would hand them to myself out of the bottle when we met. I have an unmistakeable recollection of this fact, and it was for this reason I dubbed it "omnivorous."*

When collecting (I remember especially at Yakima City, where Colias was unusually common), I not only put into a single paper envelope specimens taken "in copula," but also those playing together and taken with the same sweep of the net, so that the fact of being in the same envelope is not proof of copulation, in all cases, so far as I am concerned.

When we reached camp after collecting, I used to prepare and number the lepidoptera first, and then assisted Mr. Henshaw with the beetles and other insects, which were packed "en masse" in pill-boxes, the latter labeled as were the envelopes with the number of the camp.

During the trip there was entire harmony and free discussion between Mr. Henshaw and myself. I believe I am correct in adding that at that time none of the party knew exactly what species of Colias we were collecting.

Now to the gist of the whole matter, which is a question as to the action of cyanide of potassium on the yellows of the genus Colias, and in particular, on one individual specimen of this genus taken during our wanderings in Washington Territory.

Now, although we discussed *Menapia*, *Machaon* and *Leto*,† I never heard of this "cyanide changed Colias" until its discussion in the periodicals. To me it would have been of peculiar interest, as I happened to have suffered severely by the action of cyanide on yellow insects on a former occasion, when in Fresno County I collected several hundred yellow marked hymenoptera in excessively hot weather (the bottle perspiring

* See Papilio, iv., p. 170, for this expression. In Ent. Amer., i., p. 119, Mr. Henshaw seems to object to the word "omnivorous."

† Henshaw, paper before cited.

freely), and had them all transformed to a lot of brilliant red and black forms, mottled with unchanged yellow. Again, if it had been the initiation of a scientific experiment, so keen an observer as Dr. Hagen would surely not have been content with a single experiment, when Colias was common everywhere; but having had his curiosity excited, would have prosecuted the investigation to its legitimate conclusion.

Again, the statement that "the supposed change of color appeared after the specimen was dry," is inconsistent with the action of cyanide of potassium on yellow insects, as the change is palpable while they are wet, if they change at all; and it almost involves the conclusion that the change was not discovered till months afterwards, as the specimen in question must certainly have been "enveloped" the same day, and the envelope remained unopened until it reached the Museum.

In conclusion, I may say that for all scientific purposes this specimen should be ignored as having less than an infinitesimal value. Mr. Henshaw states the case exactly (Entom. Americana, vol. 1, p. 119) when he says: "In regard to the Colias similar in color to *Astraea*, I have only to say that a yellow Colias recognized in the field as closely corresponding to, if not identical with others previously collected, was placed in a damp, freshly prepared cyanide bottle, and when taken from the bottle the hind wings were wet; the specimen was preserved and the facts noted at the express wish of Dr. Hagen." I have never seen Dr. Hagen's original paper, so that I do not know at what point the particular Colias in question was taken, but the accidental breakage of Mr. Henshaw's collecting bottle explains the preparation of a new one; his habit of collecting lepidoptera in the same bottle with beetles explains why the Colias happened to be in the bottle, and it only remains for us to decide what insect went into the bottle, that is, what particular form. Mr. Henshaw says: "Close to if not identical with others previously collected," but as I find in my note-book, "July 4—Took very fine series of Colias (3 forms)," the question is evidently left open. It might have been either one of these or some other. Mr. Henshaw's admission just quoted, with my own additions, give faithfully the history of the "specimen," and show that any scientific deductions based thereon rest on a most unsubstantial foundation.

San Francisco, Dec. 9, 1885.

A MONOGRAPH OF THE APHIDIDÆ, BY JULES LICHTENSTEIN, MONTPELLIER, FRANCE.

BY J. T. MONELL, BONNE TERRE, MO.

Judging by the first volume of this work, which I have lately received, it will prove of great value to American students of this difficult family. The first volume is illustrated by a number of finely colored plates, and Mr. Lichtenstein promises in his preface to use all such funds as he may obtain from subscribers to the work, in illustrating the second volume—thus practically making subscribers a present of the text. While the monograph will deal more particularly with European species, many notes will be given comparing nearly allied American with European forms.

Considering Mr. Lichtenstein's eminence as an Entomologist, and the many years he has devoted to this family, this work can not fail to receive a hearty welcome from the Entomological public.

DESCRIPTION OF A NEW CHALCID, PARASITIC ON MANTIS CAROLINA, SAY.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Sub-fam., TORYMINÆ.

Podagrion Spinola.

PODAGRION MANTIS, n. sp.

♀. Length .15 inch; ovip., .14 inch. Dull metallic green, finely punctate and sparsely covered with short, whitish pubescence; antennæ and legs dull yellow; flagellum brownish above, all coxæ metallic green, sculptured, posterior ones large, tips of feet black. The posterior femora are greatly swollen as in the Chalcidinæ, armed with about eight large teeth, brown at sides but brassy along upper surface, pubescent, tibiæ greatly curved; abdomen metallic green variegated with brown, compressed and shaped as in the ichneumon genus *Ophion;* wings hyaline, veins brown, marginal and post-marginal veins long, stigmal vein short, thick.

Described from one female specimen bred from egg mass of *Mantis carolina* Say. This is an interesting discovery, and the first species of the genus to be described in our fauna.

Dr. Mayr, in "Die Europaischen Torymiden," in a foot note gives the synonymns of this genus as follows :

Podagrion Spinola. Ann. du Museum d'Hist. Nat., xvii., 1811, p. 147.

Palmon Dalman. Vet. ac. Handl., 1825.

Priomerus Walker. Ent. Mag. I., 1833, p. 118.

Bactyrischion Costa. De quib. nov. Ins. Gen., 1857, p. 5, f. 4.

Several species in this genus are known to science, and it is a remarkable fact that the habits of only one species are known, *Podagrion (Palmon) religiosus* Westwood, and that that also should be parasitic on *Mantis* eggs *(Mantis religiosus).*

NOTES ON THE LARVÆ OF HARRISIMEMNA SEXGUTTATA, Harr.

BY CHARLES F. GOODHUE, WEBSTER, N. H.

During August and September the larvæ of this fine moth are often seen feeding on the lilac. When full grown it is of peculiar shape and markings, and taken altogether, a hideous looking object, and one which few people besides an entomologist would care to have anything to do with.

Mature larva, 1.75 inches long.

Head and adjoining segment black, segments 3 and 4 yellow with black points, segments 5, 6 and 7 are brown varied with white, and 8, 9 and 10 are white, 11, 12 and 13 are brownish black. It is deeply incised between the segments, and the abdominal feet are long, especially the first two pair. Segments 6 and 12 are much produced dorsally, being very pointed; this, together with the habit of arching the body between the anterior feet and the long abdominal ones, causes it to present a very irregular and jagged outline.

On the top of all the segments are a few rather long scattering hairs. It has the peculiarity of retaining the cast off skin of the head and part of second segment on these hairs, which are not shed with the rest of the skin; first near the tip of the hairs the head case is small, a little below this is another, and so on. We have quite often seen three of these cast off skins on a larva at one time.

They will, if ever so slightly disturbed, raise the front part of the body back to the abdominal feet, and thresh it violently from side to side; in fact, their heads shake nearly all the time, like a person with the palsy.

We had often tried to rear the larvæ, but always failed until we discovered the cause. After they were full fed they would rove around the feed box, gnawing a little here and there, but refusing to pupate, and finally died.

A few years ago several larvæ were discovered on a lilac bush where we could watch them daily; when ready to pupate they left the leaves and went down the stalks until they found one that was dead and somewhat decayed; here they bored round holes of the same diameter as their bodies, they wadded the chips up into round balls about the size of B. shot, as they took them out, and then dropped them to the ground. The holes extended into the stalk horizontally about .25 of an inch, and then down about two inches; when finished it was a perfect woodpecker's hole in miniature. After the holes were made the larvæ entered them, but whether they backed in or went in head first was not observed. It is probable that the former method was adopted, as the holes were so small it is scarcely possible that they could have turned after entering. They covered the opening with a thin parchment like silk, very near the color of the bark on the stalk, so that the place was hardly observable; in a few days the change to pupa takes place, and the moth comes out the next spring. Any one wishing to rear the larva of this moth can readily do so by putting some partly decayed sticks of lilac into the breeding cage. When they are full fed they will make their holes in the sticks as readily as when at liberty.

CORRESPONDENCE.

EXPLANATION.

Dear Sir: In reference to an article by the Rev. Geo. W. Taylor, of Vancouver Island, in the December No. (1885) of the ENTOMOLOGIST, a few words in explanation of my connection with the matter seem to be in place.

In looking over the collection he sent me, in the usual way for identification, I noted several species new to me, and I believed new to science. This opinion was shared in by the Toronto Entomologists to whom I showed them. Being in correspondence with M. L'Abbe Provancher, and believing him to be the best American authority on Northern Hymenoptera, I mailed the lot to him, except about twenty species, about the identity of which there could be no doubt. In a short time the box was

returned with a list of identifications and an explanatory note, in which the species found to be new were mentioned, with a statement that descriptions would appear in an early number of the "Naturaliste." The temporary suspension of the periodical doubtless prevented this.

I do not now remember what information I gave as to the collector, but I see from M. L'Abbe's note above referred to that he knew I did not own them, and that I had to return them to Vancouver. And if I remember aright, the box and many of the specimens were labelled with Mr. Taylor's name.

At this time I was compiling a list of Canadian Hymenoptera on which I entered Mr. Taylor's species, those undescribed being credited to Provancher. This list was afterwards incorporated in a check list of Canadian insects published by the Natural History Society of Toronto, in the preface of which Mr. Taylor is credited with a valuable contribution.

Before returning the collection to Mr. Taylor, I submitted it to a meeting of the Natural History Society, with M. L'Abbe's identifications, and read a short paper on the group as compared with Ontario species. This paper I intended to enlarge and publish as soon as M. L'Abbe's descriptions were available. The publication of the list by Mr. Taylor took the matter out of my hands, and I considered I had nothing further to do with it. What material M. L'Abbe had for his descriptions I do not know—doubtless quite ample—but all the Vancouver Island specimens he ever had from me were those sent to me by Mr. Taylor.

W. Brodie, Toronto, Ont.

Dear Sir: In the Can. Ent., xvii., p. 243, Mr. C. F. Goodhue describes the larva of *Hemileuca maia* Dru., and refers to the description of the larva in Morris' Synopsis as the only one known to him. The larva has been described and figured by Smith & Abbott, Ins. Ga., pl. 50, figuring the two forms; by Westwood, Ed. Dru., ii., 45; by Harris, Inj. Ins. (Flint Ed.), p. 397; by Morris, Syn., p. 221; by Lintner, 23 Ann. Rep. State Cab. Nat. Hist., 1869, p. 153, giving a very full history; and by Riley, 5th Mo. Rept., 127–133, giving the complete life history with figures of egg masses, larva and imago, and noting very fully all color variations of the larva. *Spirea* seems a new food plant, but both oak and willow are well established as such.

John B. Smith, National Museum, Washington, D. C.

The Canadian Entomologist.

VOL. XVIII. LONDON, APRIL, 1886. No. 4

DESCRIPTION OF NEW SPECIES OF BUTTERFLIES FOUND IN THE UNITED STATES.

BY W. H. EDWARDS, COALBURGH, W. VA.

1. ARGYNNIS SEMIRAMIS.

Male.—Expands about 2.3 inches.

Upper side bright fulvous, very little obscured at base; the black markings much as in *Adiante*, that is, slight on primaries, and still more so on secondaries, the spots on disk and to base being scarcely more than streaks.

Under side of primaries cinnamon-red at base and along inner margin to median, the upper two median interspaces more or less buff in middle; this red also crosses basal half of cell, and borders median to the arc; the remainder of cell and the discoidal and costal interspaces buff; a brown sub-apical patch, and hind margin brown; the sub-marginal crescents brown, and near apex lost in the ground color, from upper branch of median containing imperfectly silvered spots, the others without silver; the two spots on the patch well silvered.

Secondaries ferruginous-brown from base to second row of spots, mottled with a lighter shade; in some examples there is more of the light, the deepest color being in and above cell; the band between the two outer rows of spots quite clear, in color brownish buff; all the spots well silvered; those of marginal row long and narrow, of second row mostly large; so also of third row; all of these two rows edged slightly on basal side with black.

Body above concolored with wings, the thorax somewhat brown, beneath yellow-buff throughout; legs same, the upper sides reddish; palpi yellowish, red in front and at tip; antennæ black above, ferruginous below; club black, ferruginous at tip.

Female.—Expands about 3.7 inches.

Upper side nearly same color as in male, the markings of same character, sometimes almost obliterated on disks of secondaries. Under side

of primaries red over a large part of the wing, the upper outer corner only of cell being buff; the spots well silvered, the submarginal being usually limited to upper half the wing, as in the male, but examples occur in which silver is found down to lower median nervule.

Secondaries sometimes wholly fawn-color, except that the band has a tint only of yellow; in other examples the ground is darker, more brown, and the band is more distinct; all spots well silvered, those of the outer row sub-crescent and broad, of second row mostly large, and egg-shaped; the spots are closely as in *Coronis* and *Callippe*.

From San Bernardino, California, taken by Mr. W. G. Wright. I have seen upwards of 30 examples of this species, male and female, and the characters are very constant. It is curious how the markings resemble two such different species as *Adiante* (upper side) and *Coronis* (lower side).

2. ARGYNNIS CYPRIS.

Male.—Expands 2.8 to 3 inches; size of *Alcestis*, which it closely resembles. Upper side bright fulvous, scarcely at all obscured by brown at base; the black markings light; both wings bordered by a double line, the submarginal lunules touching it only at apex of primaries; the round spots small; the mesial band of secondaries represented by narrow and small crescents; the spot in cell more like figure 2 than letter S; fringes black at ends of nervules, yellowish in the interspaces.

Under side of primaries nearly all cinnamon-red, only the upper outer corner of cell and the interspaces next beyond being buff; apex and hind margin brown, the latter shading into the red of wing towards inner angle; the lower three or four submarginal spots sharply serrated, black, the rest same brown as the margin, and not defined; these last only enclosing spots which are imperfectly silvered; on the sub-apical patch three well silvered spots.

Under side of secondaries light ferruginous-brown from base to farther side the second row of spots, mottled a little with reddish buff; the margin and the shadows over the outer spots same brown; the band reddish buff, much encroached on by the brown ground on either side, after the manner of *Aphrodite*, and more or less sprinkled with brown scales; the spots rather small, and well-silvered; the marginal row sub-triangular, sometimes broad, sometimes quite narrow; the spots of second row mostly egg-shaped; and these as well as the next row are edged on basal side

rather heavily with black ; a little silver at the junctions of the nervures at base, and along the shoulder and inner margins ; a small spot in cell in black ring.

Body concolored with the wings, thorax somewhat brown ; beneath, abdomen yellow-buff, thorax same, but with many red hairs ; legs red on upper sides, yellowish below ; palpi yellowish within, red without and at tip ; antennæ black above, fulvous below ; club black, tip ferruginous.

Female.—Expands 2.8 to 3 inches.

Color less bright, over secondaries decidedly reddish next base and on disk, the bases much obscured ; the markings heavier ; the marginal lines on both wings more or less confluent, and on primaries making a broad and solid border ; the spots on secondaries as in the male, the mesial band being broken into a series of separated crescents.

Under side of primaries fiery-red, the outer corner of cell and next interspaces yellow-buff ; the silver spots limited to the upper half wing, the serrations below these sharp and black.

Secondaries deep ferruginous, mottled a little with reddish buff ; the band encroached on as in the male ; the spots scarcely larger, and all well-silvered.

Found from Arizona to Montana. Taken in Colorado in 1871 by Mr. Mead ; by Mr. Morrison, in his trips to So. Colorado and to Arizona ; by Mr. Nash and Mr. Bruce in Colorado. It seems to be an abundant species in the latter State. From the time I received examples from Mr. Mead this form was a puzzle to me. It looked a good deal like *Aphrodite*, but yet was considerably unlike the Atlantic *Aphrodite*. When *Alcestis* was separated, this Rocky Mountain form seemed still more like that, but was manifestly distinct from it. In 1884, I received eggs from Mr. Nash, Pueblo, Col., and the females that laid them. From these I bred the larvæ and got three imagos, one male and two females, in 1885. I had not felt sure before that this form of male belonged to these females. The larvæ of *Aphrodite* and *Alcestis* I am well acquainted with. Both are brown-black when mature, with no other colors than what is present at the base of the tubercles, yellow or orange. In the present species the larvæ showed marked differences from those mentioned before they were half grown, and the mature larva is quite another affair, largely yellow, mottled black and yellow. As I shall figure the species and these stages in Vol. 3, Butterflies N. A., now begun, I will not describe the preparatory stages here. This is the species by mistake spoken of as

Halcyone in my letter to Professor Lintner, printed in Ent. Amer., 1, p. 213. *Halcyone* does not belong to the *Aphrodite* sub-group, but to that of *Coronis*. The larvæ of *Aphrodite* and *Alcestis*, as well as of *Cybele* and *Idalia*, will all be figured in my Volume 3; and some other Argynnids also for that matter.

3. Melitaea Wrightii.

Male.—Expands 1.3 inch.

Upper side black, marked with fiery fulvous and ochre-yellow; primaries have nearly all the cell red, in the example under view, sprinkled along median and at outer end with black scales; the marginal spots from near apex to upper branch of median, four in number, are large, rounded, the lowest one elongated, red, and the interspaces before each are red between the two rows of yellow spots; these spots of the first, or outer row, are all small, one to each interspace, and cross the wing, almost parallel with hind margin, but somewhat sinuous; the second row crosses the wing beyond cell, is made up of large spots, the one of upper median interspace wanting; a large spot of same color at outer end of cell, and another below.

Secondaries black; a marginal series of large ochre-yellow rounded spots, a sub-marginal of small, and a third of elongated across the disk, besides four nearer base, all these ochre yellow; fringes black at ends of nervules, pale yellow in the interspaces.

Under side of primaries red, the yellow spots repeated and enlarged; the red marginal spots replaced by yellow, the one in upper median interspace wanting, and the ground there being red.

Secondaries black, nearly covered with ochre-yellow spots; the marginal series large, irregular in size, nearly all sub-quadrangular; above these a row of small, round, on the black ground; the discal series much longer than on upper side, and the last one is extended up inner margin almost to base; about base and in cell six spots cover nearly all the surface.

Body black, the rings of abdomen edged by yellow; under side yellow; legs red; palpi yellow, red without and at tip; antennæ black; club black, ferruginous at tip and beneath.

Female.—Expands 1.8 inch.

Similar to male, the apex largely red in all the interspaces, and the cell throughout; the spots on both wings, both red and yellow, larger.

Under side as in male, the yellow spots of submarginal row on secondaries more or less confluent with the marginal.

From 1 male, 1 female, sent me by Mr. W. G. Wright, taken at San Bernardino, flying with *Leanira*. Mr. Wright had in all 2 males and 2 females, the only examples observed by him. The species is nearest *Fulvia*, and is distinguished at once by its excess of red.

COLEOPTERA FOUND IN DEAD TRUNKS OF TILIA AMERICANA L., IN OCTOBER.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

Having examined a good number of dead trunks of the basswood or American linden, * *Tilia Americana L.*, here this fall, I have found quite a list of Coleoptera in them either under the bark or in the decayed wood. The following is the list, which embraces thirty-four species taken from 13th October to 3rd November, 1885. Some of the species are only of accidental occurrence in the trunks, but will be readily known, and are given to record them from this locality. The determinations are mostly by Dr. Horn:—

Tachys nanus Gyll. Colonies or scattered individuals mixed with colonies of *Silvanus planatus* Germ., or by themselves, under the bark of the less decayed trunks.

Tachys flavicauda Say. One immature specimen by itself under the bark of a small decayed trunk, 17th October.

Pterostichus honestus Say. One or two specimens under some of the loose bark.

Platynus sinuatus Dej. Several under the same bark with the preceding.

Chlaenius circumcinctus Say. Remains of one specimen found under the bark of an upright decayed trunk out in the water, by the edge of the river.

---

* As a supplementary note to the trees of the main river district given in a previous article (CAN. ENTOM, XVII., p. 170), I would say that I omitted to mention the basswood, which is one of the most prominent trees of the rich woods along the St. Joseph River here, on account of its stately growth and straight, bare trunk, extending upward, smooth often for more than half its height. The button-wood or Western plane tree, called also sycamore, is of the same district.

Xantholinus cephalus Say. One under the bark.

Enchomus ventriculus Say. Taken singly under the bark.

Silvanus planatus Germ. Numerous colonies under the bark of the less decayed trunks.

Cucujus clavipes Fab. Four fine imagos taken 13th October, under the bark of a fallen trunk, one in an enclosure of borings formed on the inside surface of the bark, with pupal skin from which it had lately emerged beside it in the cell. On the inside of a strip of bark from another prostrate trunk, there were 18 or 20 of the empty cells in a continuous patch, where the beetles had transformed, six of these being in an exactly straight row, with their edges meeting in perfect regularity. Numbers of the larvæ under the bark of the trunks.

Læmophlæus pusillus Sch. One colony of about 25 individuals under the bark, 3rd November.

Brontes dubius Fab. Two specimens taken at different times under the bark, 13th and 15th October.

Hister vernus Say. A solitary specimen under the bark, 15th October.

Hister carolinus Payk. A solitary specimen under the bark, 3rd November.

Tenebrioides castanea Melsh. A number taken under the bark of a small, dry, decaying upright trunk, and an occasional specimen in other trunks.

Alaus oculatus Linn. Four of the beetles taken in the decaying wood of the trunks, and, 13th October, one pupa. Of the four imagos, three show inequality of the elytra, one considerably, the two others slightly.

Elater manipularis Cand. One specimen under the bark, 3rd November.

Melanotus communis Gyll. Under the bark.

Buprestidæ, larvæ of one species. A number of small, flat, big-headed borers taken 15th October boring between the bark and the wood of a rather sound trunk, one just beginning to decay, the bark being tight.

Cis chevrolatii Mellié. Two specimens taken 13th October, one on a small, hard kind of fungus growing out of the bark, the other under the bark.

Parandra brunnea Fab. Several dried specimens found under the

loose, dry bark where a fallen trunk had broken over, its base being suspended from the stump.

Cerambycidæ, larvæ of two species. Borers of uncertain genera, taken 15th October in same trunk with the *Buprestidæ* larvæ referred to above. A round, pinkish larva of moderate size, taken boring in the bark; and some larger and stouter larvæ, whitish or yellowish and round, boring first between the bark and wood, and afterward penetrating the wood and stopping up their passages with borings next the bark. Some larvæ very much like the latter, taken 3rd November in the decayed wood of another trunk.

Chrysomela elegans Oliv. Remains of one specimen, with the color well preserved, found under the bark.

Nyctobates pennsylvanica DeG. Common under the bark.

Scotobates calcaratus Fab. Remains (elytra and abdomen) of one specimen found in its cell, where it had transformed and died, in the decayed wood of an upright trunk in the water by the edge of the river.

Hoplocephala bicornis Oliv. Seven specimens altogether. One male under the bark, 13th October, one male in the decayed wood, 17th October, and three male and two female specimens under the bark, 3rd November. Of those taken the latter date, four were in company together, The specimen taken in the decayed wood was in a small cell or passage. and was found in such a manner as to indicate that it had fed on the wood.

Platydema ruficorne Sturm. Nine specimens together under the bark at the base of an upright trunk, 13th October, and a company of fifteen under bark of a prostrate trunk, 15th October.

Tetratoma truncorum Lec. Four specimens, taken 13th October, under the loose, dry bark of the fallen trunk suspended at the base, and one, 17th October, in the decayed wood of a small, upright trunk. Two of those taken 13th October were *in coitu*, and remained joined after death in the alcohol bottle.

Penthe obliquata Fab. Two specimens taken at different times under the bark, 13th and 15th October.

Eustrophus bicolor Say. One solitary specimen taken 15th October, under the bark.

Orchesia castanea Melsh. Several taken under the loose, dry bark of a small upright trunk, 13th and 17th October.

Eupsalis minuta Drury. A single, apparently dead specimen, taken

3rd November in the decaying wood of a fallen trunk, where a piece had previously been broken out of it. It is likely to have been bred in the wood. Have taken numbers here under bark of dead oak.

Stenoscelis brevis Boh. Three specimens (one immature, being very light with only a slight tinge of color), taken 17th October in two small upright trunks, in their little cells in the dead and rotten wood, upon which they had without doubt fed in the larva state, and there changed afterward to perfect beetles.

Cratoparis lunatus Fab. Three specimens, two taken 13th October and one 17th October, in same trunks as preceding, under the loose bark but near some small holes in the wood, from which it is very probable they had lately emerged. I am inclined to the opinion that they had passed their larva state in the trunks, feeding on the decaying wood.

NOTES ON HYMENOPTERA, COLLECTED NEAR OTTAWA.

BY J. A. GUIGNARD, OTTAWA.

Within the first year of work in this branch of entomology in the Ottawa district, I was able to make acquaintance with all the 26 orders into which Hymenoptera are divided in Mr. Brodie's Canadian list; and now at the end of our second year, out of 247 genera, only about 70 remain unrepresented, while 13 genera are added not yet before met with in Canada, two of which have never been described.

I shall leave out the *Uroceridæ* and *Tenthredinidae*, and not include them in the following figures, as Mr. W. H. Harrington has given especial attention to those two orders, and has already published an article on them.

As far as yet known, about 110 species new to Canada have been taken in this neighborhood, and more than half of them have been pronounced to be new to science by our high authority, Abbé Provancher, who has undertaken to describe them.

As to those already described, the Abbé, who has been so kind as to examine and identify them, has been greatly surprised at our possessing here many insects never before found in so high a latitude.

Order I. Among the *Apidæ* we have, for instance, obtained the red-girded *Bombus rufocinctus* Cress. We have also, however, *B. groenlandicus* Smith, which connects us with quite a different climate.

In the genus *Apathus*, we have a large new species, with black abdomen.

Order II. We raise the number of Canadian *Andrenidæ* from 120 to 125, a dozen being new species, one of a new genus close to *Stelis*; they are: 5 *Andrenæ*, 2 *Halicti*, 1 *Heriades*, 2 *Sphecodes*, besides another insect which Abbé Provancher has, on a first examination, placed among the *Anthophoræ*, but which, from its mouth-parts, seems to me to be nearer *Andrena*.

Of *Andrenidæ* described by Smith, we obtained:—

Andrena clypeata, male, yellow-faced, rather common, originally found in Florida.

A. fragilis, remarkable for its immensely long mandibles, and

A. victima.

Anthophora marginata?

Melissodes nigripes.

Megachile acuta, and the pretty little

Stelis fœderalis.

Of species named by Cresson, we possess:—

Halictus disparilis and *H. connexus*.

Andronicus cylindricus, whose male has very characteristic flattened and toothed antennæ.

Alcidamea pilosifrons—the antennæ of the male are also flattened, but end in a sharp hook. The females of the two species have ordinary clavate antennæ.

Orders III., IV. *Vespidæ* and *Eumenidæ*. New species, none, as well as in the Orders VIII., *Bembecidæ*, X., *Sphegidæ*, and XXIV., *Evanidæ*.

Order V. *Crabronidæ*. Besides a new *Philanthus* obtained by Mr. Harrington, we add to the list:—

Oxybelus interruptus Cress., and *O. emarginatus* Say.,

Crabro chrysanginus St. Farg., *Cr. obscurus* Smith,

Cr. producticollis, Pack., and the diminutive

Stigmus pusillus Say.

Order VI. *Nyssonidæ*. Of this order of fine lively insects we add *Alyson melleus* Say, with yellow head and thorax, two new species of *Alyson*, which would both be easily mistaken for the male *Alyson oppositus* Say, and a very small *Nysson*, unspotted black.

Order VII. *Larridæ*. What I had taken for a *Nysson* has been recognized by Abbé Provancher to be a new species of *Lyroda*. I obtained

also a new *Larra,* very much like *L. terminata* Smith both in shape and color, but smaller.

To these two new species must be added the three following: *Larra argentata* Say, *L. lævifrons* Smith, and *L. arcuata* Smith.

Order IX. *Pompilidæ.* I caught this year

Agenia calcarata Cress., and two other species of the same genus, one pitch-black, of slender body, the other stout, with red abdomen, both new;

A new *Pompilus*, with abdomen and femora tipped with white,

And a ridiculously small, but most elegant *Ceropales.*

Order XI. *Scoliadidæ.* A fine little *Tiphia* seems to be *T. tarda* Say.

Order XII. *Mutillidæ.* Only one specimen has been met with belonging to this Order, a *Methoca*, found by Mr. Harrington.

Order XIII. *Formicidæ.* The only two genera of this Order noticed before in Canada were *Formica* and *Myrmica*; to the lists of their species must be added

Formica latipes? Walsh.

Myrmica opposita, Say, and

Myrmica lineolata Say.

Of other genera we have—

Solenopsis fugax Latr., only 1 millimetre long, common to Europe and America, caught in the Parliament's conservatory.

Ponera contracta Latr., moreover

4 new *Formica* have been found,

1 " *Myrmica*,

1 " *Lasius*,

1 " *Leptothorax*, and

1 " *Amblyopone.*

But before describing most of those new insects, Abbé Provancher wants the three sexes, which we do not yet possess. Of the last named he writes:—"It is a tropical genera, new to North America." It is, therefore, a most extraordinary find.

Order XIV. *Chrysidæ.* Four species of *Chrysis* are new to the list,—of which one to science. The three before described are *Chrysis bella* Cress., *C. venusta* Cress. and *C. divergens* Cress.

Of the genus *Cleptes*, we have only one specimen, which belongs to an undescribed species.

There is to be added a new species of a genus not recorded before in

Canada, *Telenomus*. The last named a beautiful small insect of a shining black, while the *Cleptes* is rose-colored.

Order XV. *Chalcididæ*. This order of parasites and the next orders abound in more or less microscopical insects, some wingless, as found by Mr. Harrington in moss. We have sent only some of the larger ones to the Abbe' Provancher, who has identified

Smicra microgaster Say, and *Pteromalus vanessæ* Harr.,

besides referring other specimens to the genera *Callaspidia*, *Haltichella*, *Chalcis* and *Ormyrus*, all new to Canada except *Chalcis*.

Order XVI. *Cynipidæ*. Two new species have been captured by Mr. Harrington.

Rhodites bicolor Harr., and a very fine large *Halia*, of which the Abbe had been shown a specimen at St. Hyacinth, but wanting the abdomen.

Order XVII. *Proctotrupidæ*. This order gives us a new *Aneurynchus* and a new *Bathylus*.

Order XVIII. *Braconidæ*. Two new species—

Rogas parasiticus Nort., and

Chelonus lævifrons Cress. have been found, as well as seven new species—

One of *Syngaster*.

One of *Opius*.

One of *Microgaster*.

Two of *Microctonus*.

One of *Capitolinus*, a genus new to Canada, and lastly one of an undescribed genus of the tribe of the *Flexiliventres*.

Orders XIX. to XXIII. *Ichneumonidæ*. In the numerous species of this order I have very few new ones to record.

Lampronota lævigata Cress., and

Exetastes fuscipennis Cress., besides the following new species, undescribed :

One *Ichneumon*.

Three *Platylabus*.

Two *Phæogenes*.

Three *Phygadeuon*.

One *Hemiteles*.

Two *Limneria*.

One *Ephialtes.*
One *Theronia.*
One *Mesoleius.*

I regret not having time now to mention some interesting insects already on the list.

DESCRIPTION OF A SEEMINGLY RARE AND UNIQUE MOTH.

BY PH. FISCHER, BUFFALO, N. Y.

BROTIS VULNERARIA Hüb.

This moth appears to be the only one of its genus so far known in the United States.

Head small, yellowish red, almost hidden between the large and prominent eyes, which are naked ; palpi medium, slender, lighter colored ; thorax long, covered with long fine hair ; abdomen much shorter than the anal margin and Hesperi-shaped. Posterior wings elongated, costa straight, somewhat curved at apex, outer margin straight, inner margin somewhat rounded. On anterior wings the anal margin is longer than upper and outer margin, the latter being strongly rounded.

Color of entire insect a blackish brown, with three faint black lines running from inner margin to costa, on upper wings ; while there are only two on lower wing, running in a zigzag from anal to upper margin, and a single minute oval white dot within a black shading, between the two lines in equal distance from upper and anal margin. On the upper wings, nearer to apex and reaching costa, is a large triangular spot of a reddish-tinted light ochre-yellow. Antennæ long, yellow, pectinate, ending in a long thin spine. Under side, except palpi and upper tibiæ, silver grey. Size, 1¾ inches.

This interesting moth has been taken, with many other new and fine things (new in this locality), at the electric light near this city. At the first glance it resembles very much some large specimen of the darker Hesperidæ, and could easily be mistaken for one, if the strongly pectinate antennæ would not at once refer it to the Heterocera. The only figure of it has after a careful search been found in Hübner's "Zutrage," vol.

4, 2nd hundert, where the text reads thus: "From Bahia*; Es ist blos, gewagt diese Gattung für eine Geometra ampla und Erastria abstracta zu nehmen," etc., which shows that this eminent author has even been in doubt where to place this specimen, as will be seen in the text accompanying the figure, and seems inclined to refer it to the Geometridæ.

Mr. Grote, in his last list, 1882, Heterocera of the United States, mentioned it and placed it as a separate Group after Hexeris, where I think it does not rightfully belong. It is entirely different in shape of head, thorax, abdomen and wings, from its neighbors; and if a Noctuid, should be last, and just before Eupethecia. It also strongly reminds, but in shape and antennæ only, of *Amphidasys cupidaria* Gr., or *cognataria* Guen. Neither the genus nor the specimen is mentioned in the Brooklyn List. On Hübner's plate, in his vol. 4, Mr. Grote wrote under the figure thus: "Wisconsin (Hinsdale), Racine College, Wis.," without any further remarks, whether *B. vulneraria* has been found there, or only been seen by him in the collection of said College.

ON THE PROBABLE FOOD OF THE LARVA OF SCENOPINUS.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Prof. F. W. Putnam communicated to me a larva of Scenopinus found in his house under a carpet. It belongs very probably to *Sc. pallipes* Say, which was reared by Mr. Sanborn out of larva found under a carpet. The larva is figured by Prof. A. S. Packard, Guide, p. 1 and 401, and Proc. Essex Just., October, 1867, p. 94, where three other larvae found under the carpet are mentioned. There are three European species reared. *Sc. senilis* (Bouché Naturg. Ins., p. 46) is said to live in rotten fungus on willows and other trees. *Sc. fenestralis* (Assman Stett. Ent. Z. 1863, p. 400) in over-ripe strawberries; but it has been later suggested that it may belong to another species. Frauenfeld (Verh. Zool. Bot. Ges. Wien. 1864, vol. xiv) has reared *Sc. fenestralis* from larvae found in a horse hair mattress. Prof. Loew records the larvae living in a swallow's nest. Mr. Perris (Ann. Soc. Ent. Fr. 1870, vol. x., p. 230) tells that Dr.

* Bahia or San Salvador is a province of Brazil, about 600 miles north of Rio Janeiro.

Cartereau found in a swallow's nest a pupa of *Lucilia dispar* containing an imago of *Sc. fenestralis* which had not been able to leave the pupa of *Lucilia*, so the larva must have fed on it. Mr. Perris has found the pupa in wood holes made by *Hylotrapes bajulus*. He supposes the rotten fungi may have been attacked by Tineidæ or Coleopterous larvae, and that the larva of *Scenopinus* is carnivorous. Prof. F. W. Putnam found his larva near to an empty case of the cloth moth. Should it happen to be that the *Scenopinus* larva destroys those of the cloth moth? Then it would be a very beneficial insect. It would be very interesting to ascertain the fact by direct observation.

DESCRIPTIONS OF THREE NEW SPECIES OF GEOMETRIDÆ.

BY J. ELWYN BATES, SO. ABINGTON, MASS.

RHEUMAPTERA BRUNNEOMACULATA, sp. nov.

Abdomen and ground color of wings white. Head, thorax and antennæ cinereous. Inner third of fore wings containing three irregular ash-colored lines more heavily shaded towards the thorax. Mesial band crossed by two narrow, irregular and somewhat interrupted cinereous lines, between which on the inner margin of the wing is located a very distinct sub-triangular spot of deep brown color. Another larger, nearly quadrangular, very distinct brown patch, widest on costa, extends from costal margin to near the middle of the wing, in the lower part of which is located the oblong very dark brown discal dot.

The mesial band is limited exteriorly by a regularly scalloped cinereous line. A narrow sub-marginal irregularly scalloped white line shaded on both sides with brown scales; a darker patch filling two scallops above the middle and widening somewhat towards the outer margin of the wing.

A dark brown costo-apical patch about 0.04 of an inch broad, filling the space between the mesial band and the sub-marginal white line, beyond which is another small brown spot. Cilia on fore wings light brown. Hind wings with discal dot, and a strongly scalloped sub-marginal white line slightly sprinkled with brown scales, and heavily shaded interiorly with ash color.

Cilia nearly white dusted with brown scales at the terminus of the

veins. Beneath lighter ash-color with discal dots reproduced in both pairs of wings.

Expanse of wings one inch. Length of body 0.35; of fore-wings 0.45.

This fine species is described from one male captured in So. Abington, Mass., and is the only example that I have yet been able to find in ten years collecting.

It seems to be more nearly allied to *R. ruficillata*, Pack., than to any other species, yet is very different in size and markings.

SEMIOTHISA SEX-PUNCTATA,* sp. nov.

This species may perhaps be best described by a comparison with *S. granitata*, to which it seems closely allied, yet quite distinct. Antennæ simple. General color similar to many examples of *S. granitata.* Fore wings not excavated. The distinctive marks are four well defined, dark brown spots on the discal margin of the fore wings, which form the terminus of four pale ash-colored lines, while the extra discal line is rather broad, and contains two oblong parallel dark brown spots just above the middle of the wing. Discal dots barely apparent on both sides, but more distinct on hind wings. Beneath quite ochreous, but no more so than some varieties of *S. granitata.*

Expanse of wings 1.23 inches. Length of body ——? (abdomen wanting).

Described from one female captured in Elko, Nev., at an elevation of about 10,000 feet.

PHASIANE CINEREATA, sp. nov.

Antennæ simple. Head, thorax and abdomen glaucous.

General color of wings above ash-gray; beneath approaching ochreous. A narrow brown line crosses the fore wings on the inner third, becoming nearly obsolete on the costa. The oblong discal ringlet centered with white. A faint brown line runs from the middle of the inner margin to the discal ringlet, but is very faint in this vicinity. An extra-discal narrow brown line crosses the wing, becoming obsolete on outer margin of hind wing, but reappearing near the middle and continu-

* Since writing the above, I have found a female example of *S. sex-punctata* that I had overlooked. The only difference from the one described is that the two small parallel brown spots in the centre of the extra-discal shading are in this example united into one spot.

ing to the inner margin. A sub-marginal somewhat diffuse brown band crosses both wings. A marginal row of triangular, intervenous, black dots. Fringe concolorous with the wings. Discal dot on hind wings brown, distinct. Veins beneath tawny and very distinct, between which the white and brown scales are nearly equally distributed, except that the brown predominates somewhat near the costa of the fore wings, and the white near the outer margin of hind wings. Discal dots dark brown, distinct. Legs concolorous with body and wings. Length of body 0.45; fore wing 0.58; expanse of wings 1.18 inches.

Judging from Mr. Packard's description of *P. neptata*, this species seems more nearly related to that form than any other.

Described from one female taken in Elko, Nevada.

NOTES ON ANT LIONS.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

As my former notes on the Ant Lions were of interest to some of your readers, perhaps a few additional particulars on the same subject may not be objectionable to them. Having had another opportunity of observing their habits, I made the best use I could of it. The abdomen of the nymph is somewhat heart-shaped, flat beneath and very much rounded above, thickest near the thorax, and sloping off suddenly to the sides and tail, which is an acute point. The thorax is long, and with the head is narrow and flat above, a form no doubt well adapted to its requirements. Its mode of travelling is backwards, always "advancing to the rear," one side contracted, which produces a circular movement, so that when one was placed in the centre of the palm of the hand, it made two rounds before it dropped over the side. As soon as it touched the sand it put itself instantly out of sight under the surface, where it lay for a short time perfectly quiet. When it began the formation of its pit, which I watched to its completion, it commenced by a jerk of the head and thorax, which threw the sand off and exposed them to view. It lowered them at once, made a sudden start back, when the sand covered them; then another jerk and another backward move rapidly executed, always throwing the sand to the outside. In its first round it described a circle of about an inch in diameter, reducing the circle with each round. A mound was

formed in the centre and the sand ran into the trench from both sides, and thus it worked away without a halt until the mound was all thrown out, and the pit had assumed the funnel shape, when it took a rest, after which it began throwing out the sand from the centre at its leisure, deepening and widening the pit very much. The time occupied in the first part of the operation may have been about half an hour.

One that I was watching, after it had made nearly a round in commencing a pit, seemed to be dissatisfied with the location, and started off on a prospecting tour to find one more to its liking. Its course was quite discernible by the disturbance of the surface sand, although it never appeared in view. In its travels it met an obstruction, a piece of broken pine limb about four inches long and an inch and a half in diameter, imbedded about an inch in the sand. Against this it struggled until it raised it out of its bed, moving one end along an inch and a half, when it was sufficiently elevated to permit the nymph to pass on without going below its ordinary depth. It had travelled hither and thither over a space of 12 or 14 inches without stopping, before I left it. It is most amusing to place one on its back and watch it get on its feet again. Although I am afraid the operation is quite indescribable by me, I can tell what it does not do; it does not spring up like an Elater; it does not stretch out its legs as beetles generally do, they being very short, it could not nearly reach with its feet the surface on which it is laying; it does not seem merely to roll over, for when it has got on its feet it is in the identical spot it was when on its back. But while one is watching it attentively, it suddenly assumes that hazy, indefinite appearance that anything will when in rapid vibration, and when again distinctly seen it is resting quietly on its feet, but what it did more than vigorously shake itself, or how it accomplished the "presto change," I cannot say. I watched it again and again but could make nothing more of it.

The species to which these nymphs belonged would be either *abdominalis* or *obsoletus*, and they must have been nearing maturity, as some were out on the wing at the time. I took two *abdominalis*, one of them with a most unseemly length of abdomen, extending full three-fourths of an inch beyond the wings, which I take to be a female.

ABOUT CLEANING OILY SPECIMENS OF LEPIDOPTERA, ETC.

BY PH. FISCHER, BUFFALO, N. Y.

If a specimen becomes oily, it is generally believed that its beauty can never again be restored; but with a trifling cost and a little labor, any specimen will in a short time have again its former lustre, without injury to the insect. This remedy has been tried on the most tender Diurnals, as well as on Sphinges and Noctuids; it can be used on every insect. Should a specimen be oily throughout, body and wings, it may be put in the following fluid: One part of sulphuric ether to two parts of the strongest alcohol, and left therein for about 24 hours. Should the specimen be very oily, another bath may have to be applied. Should this second bath, after removing the insect, be only slightly discolored, the insect may be put in the last bath, which consists of pure sulphuric ether, in which it is left a few hours only. After being taken out and partly dried, it is put on the spreading board. Another way of cleaning specimens, where only the wings are oily, is this: The specimen is put on the spreading board, under side up, without fastening it in any way, and the purest spirits of turpentine poured on it to fully soak the wings, after which finely-powdered pipe clay is strewn thickly over the affected parts, and this left to dry. Should the clay, after being dry, be yellow, the oil is not all out of the wings, and the above has to be renewed. Should the clay be perfectly white after drying, it can be relied upon that every particle of the fatty matter is drawn out of the wings. To remove the clay it needs a little experience, though any one can do it with a little care. Hold your specimen on the upper part of the pin, and give the pin a little jerk near the point, and the clay, being brittle, will easily fall off. After it is all removed, the specimen may be brushed off with a fine camel hair brush until clean. A specimen treated in the above ways will never again become oily.

CORRESPONDENCE.

Dear Sir: Whilst out for an entomological ramble at Lachine on Nov. 11th last, I took a fine specimen of *Dicerca obscura* Fab. at the foot of a tree, but whether the tree was an oak or a maple I unfortunately did not at the time note. Now this is very interesting, as it seems to indicate that this species, too, is double-brooded. I have read of some of the

Calcophoræ being captured late in the autumn, but never of *D. obscura*. Does it also hibernate? Perhaps some one that has a better knowledge of the habits of this species than I, may be able to give us an additional record of experience. The beetle, by the way, is rather a rarity in the vicinage of Montreal.

J. F. HANSEN, Montreal.

OECANTHUS.

Dear Sir: Referring to the genus *Oecanthus*, I have only been able to find in the works of several authors *O. niveus* as damaging fruit, etc. I have taken *O. niveus* entirely about apple and hard wood; *O. fasciatus* Fitch about raspberries, etc., and certain woody weeds. They are more common than *niveus* here, and very distinct.

E. W. ALLIS, Adrian, Mich.

ON THE FULMINATING PROPERTY IN CALATHUS GREGRAIUS SAY.

While collecting in the woods, 9th November, 1884, I rolled over an old rotten log and discovered a number of reddish-brown Carabs, with lighter legs and antennæ, which proved to be *Calathus gregarius*, Say. These I captured and put in a cyanide bottle. Looking at the bottle soon afterward, I noticed that it was filled with a white smoke, which, I soon saw, was emitted by the Carabs. This somewhat surprised me, as up to that time I had never heard of this peculiarity occurring in any other genus than *Brachynus*. Since then I have seen a notice of its having been observed in *Metrius* by Mr. Ricksecker (*Eutomolog. Amer., vol. I., p. 98*). I should be glad to know if it has been noticed in *Calathus* by any other collectors.

C. H. T. TOWNSEND, Constantine, Mich.

Dear Sir: I have just become acquainted with the fact that a fine specimen of *Erebus odora* has been caught (in August, 1884) at the mouth of Eighteen-mile Creek, a few miles south of Buffalo, N. Y., by Mr. E. M. Chamot, of this city, at sugaring. The insect must evidently have been bred here, as it is not rubbed at all, only somewhat torn, and may not have been on the wing more than one night. It measures about five inches from tip to tip.

PH. FISCHER, Buffalo, N. Y.

Dear Sir: In connection with the article entitled "The Colias Controversy," by Mr. R. H. Stretch (CAN. ENT., vol. 18, p. 54–56), I would like to call attention to the fact that early in the year 1884, Mr. Stretch wrote Mr. W. H. Edwards that he knew nothing about the "purposely prepared" Colias (cf. *Papilio*, vol. 4, p. 170), but that on the 9th of December, 1885, he requires about two and a half pages of printed matter "to state in a concise manner" what he knows about it. Mr. Stretch quotes from his note-book, "*July 4th*,* took very fine series of Colias (3 forms)," and adds, "it" (the specimen under discussion) "might have been either one of these or some other." The "purposely prepared" Colias was taken at Umatala, June 25, so that we can all agree that it was "some other." Under the circumstances, I am unable to hold in high esteem Mr. Stretch's assertion that I have stated "the case exactly," or allow that he is able to add any *facts* to "The Colias Controversy." SAML. HENSHAW.

OUT EARLY.

Dear Sir: *Belostoma Americanum*, the "Electric Light Bug," as it is popularly called here, and its usual companion, *Dytiscus marginalis*, the "Water Tiger," were out abundantly this evening at the electric lamps, as last summer. The toads also put in an appearance at the same time and place as they were accustomed to do last year. E. W. CLAYPOLE.

Akron, O., March 18, 1886.

INSTANCE OF RETARDED DEVELOPMENT, AUG. 11TH, 1883, CASSIA, FLA.

Dear Sir: About June 15th, I collected nine chrysalids of *Papilio cresphontes* from orange trees. They were newly made. From June 22nd to June 27th all but one gave imagines; this, on subsequent examination, was found to be alive, and (Aug. 11th) gave also its imago, a large ♀, thus being retarded in development about 45 days—the conditions of environment being the same for all.

J. ELWYN BATES, So. Abington, Mass.

---

* The italics mine.

The Canadian Entomologist.

VOL. XVIII. LONDON, MAY, 1886. No. 5

MONOGRAPH OF THE LOMATINA OF NORTH AMERICA.

BY D. W. COQUILLETT, ANAHEIM, CAL.

The Lomatina may easily be distinguished from the other Bombylidæ by the following characters :

Front very large ; antennæ shorter than the head, the third joint at least twice as long as the first, tapering to the tip, or suddenly contracted near its base, the terminal portion styliform ; terminal style minute. Proboscis never projecting more than one half its length beyond the hyperstoma. Front and face when viewed from the side form a gentle curve, never greatly produced at base of antennæ. Wings with two submarginal and four posterior cells ; furcation of the second and third veins occurs before the small cross-vein at a distance of at least twice the length of that cross-vein. All of the tibiae bristly.

The following table contains all the genera known to occur in North America :

1.—Third basal cell open.....2

Third basal cell closed, third antennal joint when viewed from the side more than twice as long as wide, gradually tapering from near base to apex, which is blunt and bears a very short, sharp-pointed style ; pulvilli present.....4. *Oncodocera.*

2.—Third antennal joint when viewed from the side, more than twice as long as wide, suddenly contracted near its base, the terminal portion styliform ; whole of face pilose.....3

Third antennal joint when viewed from the side, but little longer than wide ; upper half of face bare ; pulvilli present....1. *Eucessia.*

3.—Pulvilli present ; face usually retreating below.....3. *Aphœbantus.*

Pulvilli wanting ; face projecting below.....2. *Leptochilus.*

Stygia elongata Say does not belong to the Lomatina.

Triodites O. S. = *Aphœbantus* Lw. At the time of establishing this genus, the Baron Osten Sacken had not seen a specimen of *Aphœbantus*

(see West. Dipt., p. 228), and the only character he gives for separating these two genera (l. c., p. 229) is that the second submarginal cell is appendiculate in *Aphœbantus*, and not appendiculate in *Triodites*, but this character frequently varies in different specimens of the same species, and sometimes even in the different wings of the same specimen. The species upon which these two genera were established (*T. mus* O. S., and *A. cervinus* Lw.) do not offer any characters that would justify their separation into two different genera.

In the following pages I have placed an exclamation point (!) after those localities from which I have obtained specimens of the species.

1. Eucessia, n. gen.

Antennæ porrect, third joint when viewed from the side scarcely longer than wide, somewhat oval in outline, but tapering to the tip, which is blunt and bears a very short style, tipped with a short bristle; first joint longer than the second, but not one half as long as the third; first two joints of nearly an equal width, not much more than one half as wide as the third at its base. Face retreating below, bare except on oral margin. Head a little thicker than long, wider than the thorax, and fully three fourths as large. Thorax with bristles in front of wings and on hind angles. Scutellum rounded behind. Wings with two submarginal and four posterior cells, all of the latter open, as is also the third basal; small cross-vein near middle of discal cell; furcation of second and third veins occurs before proximal end of discal cell. All of the tibiae provided with bristles; pulvilli pad-like.

Eucessia rubens, n. sp.—♀. Front black, the lower half white pollinose, reddish or white pilose; face densely silvery-white pollinose, the upper part bare, oral margin white and reddish pilose; proboscis not projecting beyond hyperstoma. Antennal joints proportioned as 2, 1 and 6; first two joints reddish, the third black. Occiput white tomentose, that in middle above, reddish. Thorax black, reddish tomentose, the bristles also reddish; pleura white pilose. Scutellum reddish, above black, its tomentum and bristles reddish. Abdomen reddish, tomentum concolorous except a white vittae on middle of dorsum and one on each side; pile of first segment white, dense on the sides, that on sides of other segments sparse, reddish; venter reddish, its tomentum concolorous. Legs reddish, tomentum concolorous, that on hind side of each femur and

on front side of hind femora at base, white ; bristles reddish ; apex of tarsi black. Wings hyaline, costal cell yellowish.

♂. Eyes quite widely separated on the front, the latter wholly silvery white pollinose ; hypopygium very large and greatly dilated below.

Length 4–5 m.m. Cal. ! 4 ♂ and 6 ♀, in Sept. (several pairs were in coitu).

2. Leptochilus, Loew.

1.—Hind margin of scutellum shallowly concave, wings hyaline, costal cell yellowish.....*modestus* Lw.

Hind margin of scutellum convex, basal third or more of wings blackish-brown.....*transitus*, n. sp.

L. transitus, n. sp.— ♀. Front black, the lower half gray pollinose, black pilose, that next the antennae white ; face black, gray pollinose, yellowish and black pilose, most abundant on oral margin ; face and front apparently destitute of short, appressed tomentum ; proboscis never projects more than one half the length of its labellæ beyond hyperstoma. Antennæ black, first joint about four times as long as the second. Occiput gray pollinose, the upper part yellowish tomentose. Thorax black, yellowish tomentose, sides broadly white tomentose ; pile and bristles largely black ; pleura white pilose, that on upper part yellowish. Scutellum shining black, rounded behind, yellowish tomentose, the pile and bristles black. Abdomen black, yellowish tomentose, that on base of each segment white ; sides of first segment abundant whitish pilose, sides of other segments very sparse black and white pilose, dorsum of abdomen sparse long black pilose ; venter black, white tomentose. Femora black, tibiae, bases of tarsi and sometimes of the femora, reddish ; apex of tarsi and sometimes base of hind tarsi and apex of hind tibiae, black ; tomentum of legs white, the bristles reddish. Wings hyaline at the apex, the base brown, the outline of this color extending from apex of first vein obliquely to second vein, then basally a short distance, then transversely to discal cell beyond small cross-vein, then basally to base of discal cell, then transversely to extreme base of fourth posterior cell, then basally to axillary incision.

♂. Eyes narrowly separated on the front, hypopygium small and not dilated below.

Length 5–8 m. m. Cal. ! 10 ♂ and 7 ♀ in April.

L. modestus Loew.—♀. Differs from *transitus* as follows: Front whitish tomentose, and black and yellowish pilose; face whitish tomentose, oral margin yellowish pilose; proboscis projects about one fourth its length beyond hyperstoma; first two joints of antennæ yellowish pilose. Occiput whitish tomentose, that in middle above reddish. Thorax mixed whitish and yellow tomentose, more whitish in front and each side; pile reddish and black, longest behind; bristles reddish; pleura white pilose. Scutellum shallowly concave behind, mixed white and yellow tomentose, pile and bristles reddish. Abdomen largely reddish, tomentose, that on base and sides whitish; pile white and yellowish; venter mixed white and yellowish tomentose. Tomentum of legs mixed white and yellowish. Wings hyaline, costal cell yellowish.

♂. Hypopygium rather large, and considerably dilated below.

Length, 7–10 m. m. Cal.! Texas. 5 ♂ and 5 ♀ in April and May.

3. Aphœbantus Loew. (Syn. *Triodites* O. S.)

1.—Thorax and abdomen destitute of white-tomentose dorsal vittæ....2

Thorax with two, abdomen with one white-tomentose dorsal vitta.....*vittatus* n. sp.

2.—Proboscis never projects more than the length of its labellæ beyond the hyperstoma.....3

Proboscis projects half its length beyond the hyperstoma..*litus*, n. sp.

3.—Abdomen black tomentose and with white-tomentose cross bands.....*mus* O. S.

Abdomen yellowish tomentose, destitute of distinct white-tomentose cross bands.....4

4.—Abdomen densely clothed with long, erect, whitish pile; abdomen of male depressed, about as wide as the thorax, in outline elongate-ellipsoidal.....*hirsutus*, n. sp.

Abdomen never densely clothed with long erect pile, abdomen of male usually sub-cylindrical and tapering posteriorly.*cervinus* Lw.

Aphœbantus litus, n. sp.—♀. Front black, the lower half gray pollinose, mixed yellowish and white tomentose and black pilose; face black, destitute of tomentum, densely gray pollinose except on lower edge, sparse white and yellowish pilose, most abundant in middle below; oral margin white and yellowish; proboscis projects about half its length beyond hyperstoma. Antennae black, first joint nearly twice as long as the second, and about as long as the thickened basal part of third; styliform portion

of third joint very slender, and about three times as long as the thickened basal part of this joint. Occiput gray pollinose, white tomentose, the upper part largely yellowish tomentose. Thorax black, mixed white and yellowish tomentose, the pile and bristles largely black; pleura white pilose and tomentose. Scutellum shining black, rounded behind, yellowish tomentose, the pile and bristles black. Abdomen black, mixed black, brown and whitish tomentose, the black forming a cross band at base of the second segment, the brown chiefly confined to base of each segment; first segment wholly white tomentose and pilose, pile of other segments very sparse, white; venter black, whitish tomentose. Femora and apices of tarsi black, tips of femora, tibiae wholly and bases of tarsi, reddish; tomentum of legs white, the bristles reddish. Wings hyaline, costal cell yellowish; a stump of a vein near base of anterior branch of third vein.

♂. Eyes barely contiguous on the front, the latter wholly gray pollinose and yellowish pilose, abdomen with black-tomentose cross bands at base of each segment, tarsi wholly reddish; hypopygium moderate, slightly dilated below, its upper half behind long black or reddish pilose.

Length 7–10 m. m. Cal.! 3 ♂ and 1 ♀ in Sept. The face is less retreating below than in the other species.

Aphœbantus hirsutus, n. sp.—Wholly black. Front yellowish tomentose and black pilose, face yellowish white tomentose and pilose; proboscis projects half the length of its labellæ beyond hyperstoma. Antennal joints as 2, 1 and 4, the styliform portion of the third joint about twice as long as the thickened basal part of this joint. Occiput white tomentose. Thorax yellowish tomentose and pilose; pleura white pilose. Pile and bristles of scutellum pale yellowish. Abdomen yellowish tomentose and densely clothed with long white or yellowish pile; venter white pilose. Legs white tomentose, the bristles reddish. Wings hyaline, the costal cell yellowish.

♂. Eyes very narrowly separated on the front; abdomen greatly depressed, about as wide as the thorax, elongate-ellipsoidal in outline; hypopygium very small; front and middle tibiæ with a row of white pile on the outside.

Length 7–8 m. m. Cal.! 2 ♂ and 2 ♀.

Aphœbantus mus O. S. (Syn. *Triodites mus* O. S.)—Female. Black, the tibiæ and tarsi sometimes reddish. Front gray pollinose on lower part, whitish tomentose and black pilose; face gray pollinose and whitish

pilose ; proboscis not projecting beyond hyperstoma ; styliform portion of third joint of antennae about twice as long as the thickened basal part of this joint. Occiput white tomentose. Thorax yellowish tomentose, more whitish on the sides, the bristles black or yellowish. Scutellum rounded behind, yellowish tomentose, the pile and bristles black. Abdomen black tomentose and with a white-tomentose cross band on apex of each segment except the last one ; first segment wholly white and yellowish pilose ; sides of abdomen quite abundant long white pilose ; venter white tomentose. Legs white tomentose, the bristles reddish. Wings hyaline, the sub-costal cell yellowish.

Male.—Eyes meet each other for some distance on the front.

Length 4–8 m. m. Cal. ! Ariz. ! Utah. 4 males and 7 females.

Aphœbantus vittatus, n. sp.—Female. Black, tips of femora, tibiæ and tarsi reddish. Front and face white tomentose and pilose, tomentum of front sometimes largely or wholly brownish ; proboscis not projecting beyond hyperstoma. Styliform portion of third joint of antennæ about once and a fourth as long as the thickened basal part of this joint ; second joint minute. Occiput white tomentose. Thorax brownish tomentose, and with two widely separated white-tomentose dorsal vittae ; sides of thorax and pleura white tomentose, bristles of thorax reddish. Scutellum mixed white and brown tomentose, its hind margin wholly white tomentose, the bristles black. Abdomen brown tomentose, a dorsal vitta, the sides and venter white tomentose. Legs white tomentose, the bristles reddish. Wings hyaline, the costal cell yellowish.

Male.—Eyes quite widely separated on the front, hypopygium moderate and not noticeably dilated below.

Length 4–6 m. m. Cal. ! 5 males and 5 females.

Aphœbantus cervinus Loew.—Differs from *vittatus* only in having no white-tomentose vittae on the thorax and abdomen, the sides of the thoracic dorsum and of the abdomen are not so conspicuously white tomentose, and the eyes of the male meet each other for some distance on the front. Pile of front varies from white, through yellowish, to black, and the tomentum of front varies from white to brown ; bristles of thorax, scutellum and tibiae usually reddish, but sometimes black.

Length 6–11 m. m. Cal ! Ariz. ! Col. ! Texas. 15 male and 11 females, July to Oct.

Var. *pavidus* n. var.—Differs from the typical *cervinus* in being smaller, and in having the front and face densely snow-white tomentose, but the front is sometimes brownish tomentose. Length 4–6 m. m. Cal. ! 1 male and 4 females.

4. Oncodocera Macq.

1.—Length 4–7 m. m.; first posterior cell open.....*leucoprocta*
Length 14 m. m.; first posterior cell closed.....*valida*

Oncodocera leucoprocta Wied. (Syn. *Mulio leucoprocta* Wied.; *Anthrax terminalis* Wied.; *Oncodocera dimidiata* Macq.)—Male. Wholly black, the thorax, scutellum and abdomen deep velvet-black. Wholly black pilose except front, face and last two abdominal segments, which are white pilose, but thorax sometimes largely yellowish pilose, and pile on sides of abdomen sometimes rusty-brownish. Apex of wings hyaline, the base brownish, the outline of this color extending from apex of first vein obliquely to base of fourth posterior cell, then following penultimate vein to hind margin of wing; axillary cell almost wholly hyaline; apex of first basal cell hyaline; only the extreme base of discal cell brown. Eyes contiguous for some distance; proboscis not projecting beyond hyperstoma.

Female.—Pile of head and body, except sides of abdomen, yellowish; no white pile on last two abdominal segments.

Length 4–7 m. m. N. C. ! Va., Ill., Wis., Ky., Ga., Fla. ! Mex.

Oncodocera valida Wied. (Syn. *Anthrax valida* Wied.; *Anisotamia eximia* Macq.)—As I have never seen a specimen of this species, I give below a translation of Wiedemann's original description (Aus. Zwei. Ins., II., page 636).

"Deep black, abdomen having the apex each side fulvous pilose, in the male with two vittæ; 7 lines. From Oaxaca in Mexico.

"Antennae black, with a simple style. Eyes of the ♂ contiguous, so that on the crown only a small space remains, extended in a point anteriorly. Besides these, the whole insect is black, and black pilose, only the end of the abdomen with golden-yellow, beneath even foxy-reddish, glossy, silken pile, which in the male forms two broad vittae that extend to the first segment, but in the female only forming two spots which extend across the last two segments. Wings on the costal margin for two-thirds their length brownish; in the male less dark. Veins as in the fifth tribe, except that the inner branch of the forked vein is connected with the next following vein at the hind margin of the wing."

DESCRIPTION OF THE PREPARATORY STAGES OF SATYRUS CHARON, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Conoidal, somewhat rounded at base; truncated, nearly flat, a very little convex, at top; the sides a little convex, and marked by about twenty-two sharp vertical ridges, which start from edge of base and end at rim of summit, the spaces between these ridges deeply and roundly excavated; the summit is covered with shallow cells, irregularly five and six-sided, in four rows, not concentric, but somewhat spiral, about a central rosette of rhomboids. Very like the egg of *Alope*, but there are a greater number of flutings on sides. Color lemon-yellow. Duration of this stage about 12 days.

Young Larva.—Length .1 inch; the anterior segments thickest, tapering from 3 or 4 to 13, at the extremity nearly square, with a projecting point at either side; armed with long white processes or bristles, arranged as follows: on either side, a sub-dorsal row, a second on mid-side, and a third along base; also two demi-rows confined to 2, 3, 4, one of them between the two upper rows, the other between the second and third rows; the sub-dorsal has one bristle each on 2, 3, 4, bent forward, 2 each from 5 to 12, 1 on 13, besides another proceeding from the terminal point, all bent back; the demi and lateral rows have one to each segment, all bent forward, except those on 12, 13; the lower row has two to each segment, those on 2 bent forward slightly, all the rest back; these bristles are thick at base and taper a little to a blunt point, and under a high power are seen to be rough with the stubs of branching spurs; there are also over pro- and anal legs two shorter bristles to each; in most of these bristles the bend is close to base, giving them the appearance of so many hooks; and they spring from rather prominent tubercles; color of body pinkish-yellow, with red-brown longitudinal lines, one mid-dorsal, two finer ones close together on mid-side, and another heavier than the last just over spiracles; there is also a less distinct and broken line along base; legs and pro-legs color of body; head one-half broader than 2, subglobose, narrowing upwards, the top a little depressed; color yellow-brown, specked thickly with red-brown; a few white bristles over surface, like those on body and rising from dark brown tubercles, all bent down; ocelli brown, except the largest, which is emerald-green.

About eight days after beginning to feed the larva changed color, becoming pale green, the lines as before, head as before. From end of hibernation to first moult 21 to 38 days, the larvæ being on grass in a warm room.

After First Moult.—Length at 24 hours after the moult, .15 inch; tapering from anterior segments to 13 both dorsally and laterally, the last ones a little arched; 13 ends in two conical tails, one at either side, the space between roundly excavated; body covered with rough tuberculations, from which come short stiff processes, not tapering, but small at base, and thick at end and rounded, varying in size and somewhat in length; rough also like the bristles at first stage; except on 2, where these are turned forward, all are bent back and flattened to the body, which gives a downy coating to whole surface; color green; a pale brown mid-dorsal line, two such on middle of side and another over spiracles; feet green, whitish at ends, pro-legs green; head a little broader than 2, sub-globose, bright green, pitted with darker green, rough with white tubercles, each of which gives a process like those on body, and bent down; ocelli emerald. Duration of this stage 15 to 20 days.

After Second Moult.—Length at 24 hours, .3 inch; same shape; color either yellow-green or a bluish sage-green; covered with bent processes as before; the lines as before, but green instead of brown; along base a yellow stripe; head as before. Duration of this stage 12 to 18 days.

After Third Moult.—Length at 20 hours, .4 inch; color yellow-green; tails reddish; the mid-dorsal stripe distinct, the three side lines not well defined; the basal ridge yellow; there is also now a sub-dorsal line or narrow stripe of pale yellow. Duration of this stage 15 to 20 days.

After Fourth Moult.—Length at 18 hours .54 inch; closely as in last previous stage; 5 days later was fully grown.

Mature Larva.—Length .94 inch, greatest breadth .12 inch; cylindrical, tapering from middle to end both on dorsum and sides, rather stout in middle, but not obese, the anterior segments even; ends in two sharp conical divergent tails; each segment creased six times, and on the flattened ridges so caused are numerous fine yellowish tubercles, each of which sends out a short, slender, white process, more or less pressed to the surface; color yellow-green over dorsum to sub-dorsal band, from that to base more green, less yellow; the tails pale red, on outer sides

yellow; the sub-dorsal band nearly as wide as basal, and same shade of yellow; the dorsal stripe is dark green, and is edged on either side narrowly by yellow; feet and legs green; head sub-globose, broad at base, narrowing upwards, a little depressed at top; roughly tuberculated, the tubercles in vertical rows, conical, each with white hair; color bright green; the ocelli brown, except the largest, which is emerald. Duration of this stage 20 days at the least.

CHRYSALIS.—Length, male .4 inch, female .5 to .54 inch; breadth across mesonotum, male .16, female .17; across abdomen, male .17, female .18 inch; cylindrical, abdomen conical; head case short, narrow at top and a little convex, the sides excavated; mesonotum prominent, roundly carinated, the sides somewhat convex, followed by a shallow depression; color pale yellow-green, the dorsal side throughout, and the ventral side of abdomen, thickly dotted and mottled with whitish; three whitish stripes along dorsum, one in middle, the others sub-dorsal, and running from end to end; on the wing cases are three streaks of darker green, the longest in mid-wing and reaching hind margin, the others short and stopping before margin; there are also some small patches same green; wing cases next base, the top of head case and keel of mesonotum lined with white.

Another example was wholly whitish-green, no dark streaks on wing cases and no dorsal bands.

Others were greenish-black, finely dotted gray; the three dorsal stripes gray; the wings black and gray, about equally, running in streaks with the nervules.

Another was of a dull brown, with no tinge of green, marked like the last described, but the light parts were of a pinkish-white; on the wings were three deep black streaks, corresponding to the green ones before mentioned. Duration of this stage 11 to 12 days.

This pretty little Satyrus was first made known by Mr. T. L. Mead, who took it in Colorado in 1871. It was described by me in Trans. Am. Ent. Soc., iv., p. 69, 1872, and appended was a note as follows: "This species was first met near the Twin Lakes, in Upper Arkansas Valley, elevation 8,000 feet, in July, 1871. It flew near the ground, frequently alighting on the sage-brush, and seemed much more partial to flowers than was Satyrus (Hipparchia) *Ridingsii*, also common in that vicinity. By the latter part of July it was abundant throughout the entire Park and

mountain country, and so continued till September." In Mr. Mead's Report on the Lepidoptera taken by the Wheeler Expeditions, 1875, it was farther said of *Charon:* "It was found both in South and Middle Parks, though not so abundantly as in the Arkansas Valley. In August, females were obtained and inclosed with grass; several eggs were laid; they are whitish and very similar to those of *Nephele*." I do not know that another line has been published on the habits of this butterfly than what Mr. Mead wrote or authorized as above, although the species has been taken in many localities from New Mexico to Montana, and even in British America, as appears by Captain Geddes' list. Mr. Morrison also took it in Nevada.

I received 20 eggs of *Charon* from Mr. H. W. Nash, then at Rosita, Colorado, 4th August, 1884; on the 10th August, 23 more, and many others on 14th Aug.; sent through the mail, in turned wooden boxes, the eggs all obtained by confining females in bags over grass. They came in perfect order, and began to hatch, the 1st lot, 10th Aug., the 2nd lot, 17th. The larvæ were remarkably like those of *Alope*, same shape, color, longitudinal bands and processes, and the latter were bent like fish-hooks, just as in *Alope*. I had larvæ of Hipparchia *Ridingsii* hatching at same time, and the difference between them and the larvæ of *Charon* at this stage was striking. It was generic. The same resemblance to *Alope* runs through the whole history of *Charon*, egg, all the larval stages, and the chrysalis, except that in color this last is variable as to coloration in *Charon*, and not in *Alope*.

The larvæ devoured the egg shells more or less completely, but eat no grass, and settled themselves for a winter's sleep. I left them for several weeks in the cellar, in paper pill boxes. On 10th October, they were sent to Clifton Springs, New York, and placed in the "cooler" of the Sanitarium there, temp. all the year 40° Far. On 7th March, 1885, I received the larvæ again; nearly all were alive, and they were placed on a sod of grass set in flower pot, and covered by a glass lamp chimney. On 8th, several were feeding. The first larva passed 1st moult 29th March, but several were ready to pass this moult for about a week had the weather been pleasant, instead of cold, cloudy and stormy, much of the time. Two more passed the moult 2nd April. The last one of 15 larvæ passed 1st moult 15th April; so that between the first and last was an interval of 17 days.

The second moult began on 9th April, and the last one of 10 larvæ passed same 21st April, a difference of 12 days.

The third moult began 21st April, and the last of 8 larvæ passed same 7th May, a difference of 15 days.

The fourth moult began 3rd May, and the last of 9 larvæ passed same 6th June, a difference of 34 days.

The first chrysalis formed 20th May, and the last larva was mature 10th June, and would have pupated about 15th, had I not put it in alcohol. The difference would have been about 26 days in pupating.

The first imago out of chrysalis was on 2nd June, the pupa period being from 11 to 12 days.

So that, supposing larvae to behave in natural condition as these in confinement, fresh butterflies from same brood would be coming out daily for several weeks. And so undoubtedly they do, as is the case with *Alope*.

LARVA OF COELODASYS MUSTELINA, Pack.

BY G. H. FRENCH, CARBONDALE, ILL.

Length .80 of an inch. Head oblique, narrow, slightly bilobed, about one-fourth of the head above the height of joint 2; body nearly cylindrical; on joint 5 a nearly conical projection about two-thirds as high as the depth of the body, bifid at the top, each part tipped with a hair; on joint 9 is a slight elevation, and a more prominent one on joint 12. When at rest the posterior part of the body is raised, making these elevations appear more prominent. In color, the head, joint 2, and the dorsum of joints 3 and 4 to the top of the tubercle on joint 5, is dark brownish purple mottled with gray, the sides being lighter than the front of the head and the dorsum, the latter narrow posteriorly; the sides of joints 3 and 4 are bright green with a few fine purple dots and a pale dorsal edging; the sides of the body back of joint 4 are a series of fine, close, crenate purplish red lines or mottlings on a grayish yellow ground color, more yellow above, giving the sides something of an orange appearance; the dorsum of joints 5 to 8 is more of a grayish color from the ground color being paler and the mottlings finer and more of a purple shade; a darker patch on the dorsum of joint 8, this color extending

back obliquely on joints 9 and 10, making a dark purple lateral line; the pale part of the dorsum is wider on the posterior than on the anterior of each joint, the space being bordered by an oblique purple line that fades out before quite reaching the lateral line; the rest of the dorsum is like the sides, except a little darker; between the two posterior tubercles or elevations is a clear white V, the point beginning on the anterior part of joint 10 and extending back to the posterior part of joint 11 on the sides.

Three of these larvæ were found by Mrs. French on a rose bush, September 18, 1884, nearly grown. By October 1st they had pupated, fastening the leaves together for a puparium, within which they changed. The following spring these produced three imagines, May 20, 22 and 31 respectively. No effort was made to rear a second brood, but from the time the larvæ were found in the fall it is to be presumed that there are two broods in a season.

NOTES ON CERTAIN COLEOPTERA OF THE NEIGHBORHOOD OF GALESBURG, ILL.

BY C. W. STRUMBERG.

Lebia divisa Lec.—Twenty-nine specimens of this beautiful Carabid were taken during July (1884) with the sweeping net, on various weeds along the edge of a slough. One specimen was found under a board. Towards sunset seemed to be the only time they could be captured, differing in that respect from some of the others of the genus, which are about at all hours of the day. My first specimen was taken in 1876 in same locality.

Lebia tricolor, *pleuritica* and *analis* seem to be rare. Have taken them with the sieve late in October.

Apenes sinuata Say. Oct., two specimens under a log.

Pentagonica bicolor Lec. Not rare among leaves and rubbish in the late fall and early spring. Specimens are often taken in the sweeping net during summer.

Cryptobium serpentinum Lec. Oct. 2 (1883?). Took two specimens of this fine insect under logs in moist woods.

Dicerca asperata L. & G. Was found in numbers late in the fall by searching among the fallen leaves on hill sides, especially in flat places or

depressions near large trees. Sometimes a specimen of *D. lepida* was taken, while *D. divaricata* and *D. obscura* were quite common.

Stethon pectorosus Lec. July, two specimens under bark.

Fornax badius Melsh. July 18th, 16 specimens under the bark of a stump.

CELIPTERA BIFASCIATA, Sp. Nov.

BY J. ELWYN BATES, SO. ABINGTON, MASS.

Coloration and shading as in *frustulum*, with the following exceptions, which are very marked and leave no room for doubt that it is entirely distinct from that species.

The peculiar black spots on the inner third of the fore wings of *frustulum*, are entirely wanting in this species. There is a small dark brown triangular spot acutely pointed and situated very near the costa, in line with the extra-discal row of dots, and ending on costa and outer margin of the wings. In some specimens these spots are rounded internally. A light buff-colored band crosses the wings, limiting the inner third, which is shaded heavily with chocolate-brown exteriorly. This band is nearly identical in coloration with the extra-discal one, though perhaps a trifle lighter. In *frustulum* the extra-discal band bends outward beyond the median vein, while in this species it pursues an unaltered course to the costa. Discal ringlet somewhat reniform, and smaller than in *frustulum*. Traces of two very faint brown lines crossing the fore wings in discal space, nearly parallel with the extra-discal band. A light cinereous narrow band crosses the hind wings from the inner angle to a point in line with the extra-discal band of the fore wings. Wings quite heavily shaded with brown beyond this band. No other markings on hind wings. Beneath like *frustulum*, except that it is of a darker hue. Length of fore wing, male, .70, female, .73; of body, male, .65, female, .70; expanse of wings, male, 1.50, female, 1.56 inches.

This insect is rather common at Cassia, Orange Co., Fla., where I took a number of specimens. It flies by daylight as well as by night, and is one of a very small number of species that will come to sugar in that locality.

I sent specimens of this insect to several entomologists for deter-

mination, and one returned it under the name of *C. frustulum*, and the others said it was new to them. It does not compare with any examples of *frustulum* that I have seen, and I therefore venture to describe it as a new species.

NOTE ON STATEN ISLAND NOCTUIDÆ.

BY A. R. GROTE, A. M.

My earliest collecting field was the south side of Staten Island, where I found many rare insects, especially among the Coleoptera. This south beach of the Island is visited by the warm spring coming from the south very early in the year, and is a good collecting field. Staten Island is a continuation of the Jersey coast, and one finds on it southern species of butterflies such as *Argynnis Idalia*, which are less frequent on Long Island, the next extension of the coast to the north. So far as the fauna is concerned, I am inclined to class Staten Island with New Jersey, rather than with New York. It forms the beautiful southern boundary of New York Harbor. At the same time Mr. Davis informs us that the Red Squirrel, not uncommon on the mainland of New Jersey, is not found on Staten Island, and thus has not crossed the narrow Kills. But I have abundant faith it will yet turn up on the Island, where all good things naturally live. I have collected on Staten Island a good many of those kinds of moths which come up our coast with the warmer weather and the Gulf Stream. I have in various papers called attention to the seasonal migration, from south to north, of many species of moths, which adds so much to the fauna of the United States. These moths have found a lodgment in Florida, but probably do not breed to the northward. I have taken on Staten Island *Euthisanotia Timais*, the Spanish Moth, as also *Aletia Argillacea*, the Cotton Worm. So far as I know, the northern limit of successful hibernation of the latter is not yet definitely ascertained, notwithstanding all that has been published by the U. S. Government on the subject. Also in the fall I have taken *Anomis Erosa* Hübn., a Noctuid allied to the Cotton Worm, although in the cut of wing and color it resembles *Eucirroedia Pampinatrix* Guen., a Noctuid which has, I believe, real affinities with *Scoliopteryx Libatrix*, a Noctuid found in North America and Europe. This latter inhabits Canada and Hudson's Bay

Territory. It has not been introduced, but is apparently an unchanged survival since before the Glacial Epoch, when the fauna of Siberia, northern Europe and boreal America had much in common.

Mr. Davis has given me some common Staten Island *Noctuidæ*, and it is strange that these few species should have among their number at least two southern visitants which probably do not hibernate successfully on Staten Island. I hope local lists will soon be published by the Staten Island Natural Science Association, and the following may serve as a slight introduction thereto :

Apatela occidentalis *G. & R.* July 30.
Agrotis saucia *Hübn.* Oct. 15.
" clandestina *Harris.* June 24.
Mamestra trifolii *Rott.* Aug. 15.
" renigera *Steph.* June 8.
Hadena devastatrix *Brace.* Aug 15.
" dubitans *Walk.* "
Prodenia flavimedia *Harvey.* Aug. 9.
Laphygma frugiperda *Abb. & Sm.* Aug. and Oct.
Autumnalis Riley.
Orthosia ferrugineoides *Guen.* Oct. 15.
Anomis erosa *Hübn.* Oct. 20.
Aletia argillacea *Hübn.* Oct. 7.
Eucirroedia pampina *Guen.* Sept. 2.
Pyrrhia exprimens *Walk.* July 22.
Lygranthoecia marginata *Haw.* July and Aug.
Plusia precationis *Guen.* July 22.
Syneda graphica *Hübn.* May 15.

Among the southern visitants I once took a specimen of the strange Noctuid, *Sylectra Erycata* Cram., on the Battery, New York City. Its home is, I believe, Surinam; it had certainly wandered far. The Blue and Green Sphinx, *Argeus Labruscæ* Linn., has been taken in New Jersey. This species probably does not breed within the limits of the United States, although since Mr. Thaxter has bred *Euthisanotia Timais* in southern Florida, we may expect that the Florida Colony of tropical Lepidoptera embraces many West Indian moths.

A NEW CHALCID PARASITE ON THE COMMON BASKET WORM (*Thyridopteryx ephemeræformis* Haworth).

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

This peculiar moth, which so perplexed the older Lepidopterists at classifying, is quite common in Florida on oaks, willows, shrubs, etc.

Full accounts of its habits, with accurate figures of the moth, caterpillar, etc., will be found in Prof. Riley's "First Mo. Report," Saunders' "Insects Injurious to Fruits," and Dr. Lintner's "First N. Y. Report."

Indeed, these authors quite fully, accurately and succinctly describe the habits and parasites of this pest, and it would not now be noticed by me but for the fact of my breeding from it here in Florida a Chalcid parasite new to science and unnoticed by any of the above mentioned authors.

Prof. Riley, in his report, gave but two parasites, *Pimpla inquisitor* Say, and *Hemiteles thyridopterygis* Riley. Mr. Lintner, in his work, added *Pimpla conquisitor* Say, *Chalcis ovata* Say, a *Pteromalus* allied to *Pteromalus puparum* L., and a fly—*Tachina* species—making in all six parasites.

I have now the pleasure of recording the seventh, a *species novum*, interesting from the fact that it belongs to a genus in the family *Chalcididæ*, recognized by the abnormal shape of its first antennal joint, and in which heretofore but one species was known to science, and that described from Europe.

Sub-fam. EUCYRTINÆ.

Dinocarsis thyridopterygis, n. sp.

♀. Length .06; wing exp. .14 inch. Color: pale brown, abdomen darker; posterior femora and tibiæ darker; scutellum rather large, somewhat orange.

Head much broader than thorax, eyes large, brown; antennæ long, 11-jointed, large, strongly, sub-triangularly keeled below, the three terminal joints white; wings rather long and narrow, pubescent, submarginal vein short, rather close to and parallel with outer margin, marginal vein not extending to half the length of wing, it, with stigmal and postmarginal veins, very small and about equal in length.

Described from a specimen bred in March.

The rearing of this Chalcid is quite interesting, as it is the first of the genus recorded from North America, and the second species known.

The genus *Dinocarsis* was erected by Forster in 1856, *vide* Hymenopterologische Studien, p. 33, to contain *Eucyrtus hemipterus* Dalman.

Dr. Mayr, in Die Europaischen Eucyrtiden, gives the synonymy as follows :

Dinocarsis hemiptera Dalm.

Eucyrtus hemipterus Dalm., Ict. Ac. H. 1820, p. 166 (42) und 371. Nees Hym. i. a. M., 1834, p. 252.

Dinocarsis hemiptera Forst., Hym. Stud. ii., 1856, p. 37.

Dicelloceras vibrans Six Tijdschr. v. Entomol. 1867, pl. x., f. g.

Nothing is known of this European species. Mine, while bred from the case, is evidently parasitic on the eggs enclosed therein.

NOTE ON PRIONOXYSTUS ROBINIÆ.

BY AUG. R. GROTE, A. M.

Having recently examined the European *Cossus (Xyleutes) ligniperda*, the generic differences between *Cossus* and *Prionoxystus* impressed me quite forcibly. The *Cossidæ* or *Teredines* of Hübner (Grote, Proc. Am. Phil. Soc., Nov., 1874), form a sub-family group of the "Spinners" or *Bombycidæ*, and are generally characterized by the wood-eating habit of the larvæ, which are provided with powerful mandibles for the purpose. The moths are generally of a clumsy build and are usually of a gray color, resembling the bark of trees on which they rest, and are more or less reticulated with darker shade lines, peppered and spotted so as to give the idea of protective imitation. The ocelli are wanting and the tongue is rudimentary. In the genus *Cossus*, and in most of the genera of the group, the vestiture of the body is close, thick and hairy. Although gray is the prevailing color, some Australian species have the hind wings especially of a reddish-brown hue. The European *Zeuzera Aesculi* is white, spotted over wings and thorax with steely blue. The North American genus *Prionoxystus* differs at first sight by the sparse, thinly laid on, scaly vestiture. The thorax, compared with *Cossus*, is elongated and the prothorax slopes to the head, which latter is freer than in *Cossus*. This gives the insect a Sphingid appearance which, joined to the more pointed wings and the yellow secondaries of the male, recalls certain *Macroglossinæ*, notably our *Lepisesia flavofasciata*. The parts of the head afford comparative differences when examined and compared with *Cossus*.

The chitinous tegument of the body appears readily, when the mealy vestiture is rubbed and is black and stout. The wings are very papery and a worn *Robiniæ*, as it sits on a locust or other tree, reminds one a little of some of the larger wood eating *Cerambycidæ*, such as the Prionians. The European *Cossus* is very sluggish in its habits, whereas *Prionoxystus* is, when first hatched, comparatively an active insect, flying readily when disturbed. We have two species in our fauna which I refer to *Prionoxystus*, viz., *Robiniæ* Peck, the type of the genus (found from East to West apparently), and *Querciperda* of Fitch, which I believe is only Eastern and of much rarer occurrence. With *Prionoxystus*, we have a true *Cossus*, the *Centerensis* of Lintner, beside several other species of this Fabrician genus, judging from Authors. We have also three species, Western, of the genus *Hypopta*, and then the small-sized and singular *Cossula magnifica* of Bailey, from Florida. I have never recognized the "*Zeuzera Canadensis*," figured by Herrich-Schaeffer, and it seems to me that the moth is wrongly referred and the probability is that we have no true North American species of *Zeuzera*. But it may be that the European *Aesculi* has been introduced into the United States. Twice the description of a moth was communicated to me which might have been this species. Nothing is easier than the transportation of wood-eating larvæ or pupæ. There are three European species of *Cossus*, and the larva of one of them, *Terebra*, is said to remain four years in poplar wood before pupating.

ON PLAGIOMIMICUS RICHII.

BY A. R. GROTE, A. M.

This species I have mistaken, according to Mr. J. B. Smith, for *Polenta Tepperi* in several of my papers. The moth is easily recognized, being of a delicate green color and having the transverse lines similar to *Plagiomimicus Pityochromus*, which is a blackish fuscous and stouter species. *P. Richii* has the anterior tibiæ armed with a claw and the clypeus provided with a cup-like expansion, less prominent than in *Pityochromus*. *P. Richii* occurs in Texas, Florida, and I have seen it also from the Southwest. The genus may be further known by the tips of the patagia being somewhat relieved, and belongs to the *Stiriinæ*, a group of *Noctuidæ* which I have fully discussed in the pages of the CANADIAN ENTOMOLOGIST. I regret that I have been mistaken in my identification

of *Polenta*, thus needlessly criticizing Mr. Morrison and afterwards Mr. J. B. Smith. But my first specimen of *P. Richii* (see Bull. Buf. Soc. Nat. Sci.) was given to me as authentically determined, and I was confirmed in my belief by seeing the type of *Polenta* afterwards, which curiously resembled my species, though not so brightly colored; I, however, could not examine its structure, which is now stated by Mr. Smith to be quite different from my species, *P. Richii*, inasmuch as the anterior tibiæ are said to be unarmed. I hope to be able to figure our two species of *Plagiomimicus* ere long, the genus being very interesting to me from its casual resemblance to *Lygranthoecia*, though structurally so different.

BOOK NOTICE.

Systematic Review of Fossil Myriopods, Arachnoids and Insects: By Samuel H. Scudder.

This work, separately printed in German out of the "Handbuch der Palæontologie," Leipzic, 1885, is a most welcome one to the student who was obliged to look for information as to its subject in a quantity of different publications. The text is remarkably clear and concise, and woodcuts illustrating the different genera give all possible information on the difficult subject. That so many existing families of insects were represented in the Miocene is remarkable. The beetles, owing to their hard forms and sharp outlines, are the best preserved and the most recognizable. Even a Stylops has been found in Prussian amber, which belongs to a genus which may be called *Mengea* after its discoverer, the term *Triaena* being used for a sub-genus of *Apatela* called by Guenèe afterwards *Semaphora*, and which is not unlikely to come into use as a distinct generic term. The Lepidoptera are very sparingly represented in the Tertiary, but the larger groups all existed. An interesting figure of the fossil butterfly, *Prodryas Persephone* Scudd., is given from the Oligocene of Florissant, Colorado, where the beds have proved prolific in insect remains. Even a caterpillar (Provence) has come up to us out of these abysses of time.

This brief notice of a work which will add enduringly to Mr. Scudder's reputation, will be sufficient to call the attention of the readers of the CANADIAN ENTOMOLOGIST to its publication, and is all that is here designed. The book itself will repay study, and it is hoped that it will also appear (as it doubtless also exists) in English.

A. R. GROTE.

The Canadian Entomologist.

VOL. XVIII. LONDON, JUNE, 1886. No. 6

SOME NOTES UPON THE SPHINGIDÆ OF THE UNITED STATES.

BY REV. W. J. HOLLAND, PITTSBURGH, PA.

I am indebted to my esteemed correspondent, Prof. C. H. Fernald, for a copy of his recent Synopsis of the Sphingidæ of New England. I have been greatly pleased with it, and trust that it will meet with that general distribution among the students of our beautiful science which it deserves. In the following lines I wish to present a few observations which the perusal of Prof. Fernald's book suggests.

Hemaris Tenuis, Grote.

Prof. Fernald remarks of this species: "The early stages and food plants are unknown." Presuming that the statement of the learned Professor is warranted by an exhaustive search through the literature of the subject, I shall venture to supply from my own observation what strikes me as a surprising deficiency, since *Hemaris Tenuis* is one of our most abundant species in Western Pennsylvania.

The food plant is the Snow-berry, *Symphoricarpus racemosus*, and I took last fall from one bush of this plant over twenty larvæ. My breeding cages this morning (April 26th) are full of the perfect insects, which, having just emerged from chrysalis, and lost none of the scales which at this stage cover the pellucid parts of the wings, are all of the form "*fumosa*" described by Strecker (Lepidoptera Rhopal. and Heteroceres, pp. 93, 140). Flown specimens, which abound at the lilacs in the grounds near by, are without the "smoky" appearance which led our Reading savant to apply the name, and show themselves unmistakeably as "clear-wings."

Larva and Chrysalis.—A part of each larval brood is light apple-green in color; a part is reddish brown. This phenomenon is often apparent in the larvæ of the Sphingidæ, and is manifestly not due to the influence of the food plant, as both varieties are found side by side upon

the same plant. The pro-legs and the ventral aspect of the larva are in all cases chocolate brown throughout, deepening almost to black in the reddish brown portion of the brood spoken of above. The legs proper are jet black. The head is round and only partially retractile. The edge of the fleshy fold of the first segment immediately behind the head is minutely granulated with bright yellow. The spiracles are marked by small black spots enclosing two minute white points. The caudal horn is curved forward, and is covered with minute spiny processes. It is black at the tip, the black color extending downward before and behind to the junction with the body, but on either side at the base the horn is bright yellow, gradually fading into the green of the surrounding cuticle.

The larva spins a moderately compact cocoon among dried leaves at the surface of the ground. The silk is deep brown in color. The chrysalis is from seven eighths to nine eighths of an inch in length, smooth, long in proportion to its diameter, tapering to a fine point in the cremaster, and dull black in color.

Hemaris Thysbe, var. *uniformis*, G. & R.

This form is common at Pittsburgh, and prevails altogether at Cresson, Pa., on the summit of the Allegheny Mountains. I have never found it in West Virginia, North Carolina, and Southern Indiana, where I have collected extensively. I have never received it from any of numerous correspondents and collectors south of the Potomac and the lower Ohio. Prof. Fernald tells us that this variety is "common at Orono." May it not be regarded as a peculiarly *northern form?*

Amphion Nessus, Cram.

I have taken this species on several occasions at light, and it flies most commonly at dusk in these latitudes. If found flying in the middle of the day, I have noticed that it always keeps in the shadow, or slyly hovers about among the thick masses of the *Syringa* blossoms, in the deep umbrageous recesses, where it is not easily reachcd by the net of the collector.

Daremma Undulosa, Walker.

The larva of this species feeds occasionally upon the white oak and the red oak.

Sphinx Oreodaphne, H. Edw.

I have a specimen of this insect, taken by Mr. James Behrens, and

kindly determined by Mr. H. Edwards, which I am altogether unable to distinguish from small specimens of *Sphinx Chersis* taken in the vicinity of Pittsburgh, at Orono, Me., and various other localities in the United States. The Brooklyn Check List in making *Oreodaphne* a variety of *Chersis*, hardly goes far enough. It seems to me there can be no harm done to science by making *Oreodaphne* a synonym for *Chersis*.

Sphinx Vancouverensis, H. Edw.

I have a specimen of this form, bred by Mr. Behrens and determined by Mr. H. Edwards. It is a male. If taken in Allegheny County it would be unhesitatingly pronounced to be *Sphinx Drupiferarum*, Ab. & S. Mr. Grote, in his Check List of 1882, gives *Vashti*, Strecker, as a synonym for *Vancouverensis*. A comparison of Strecker's figure in Lep., Rhopal. & Heteroceres, pl. xv., fig. 4, with the specimen before me, indicates considerable difference. In my mind it is very doubtful whether *Vashti* is correctly regarded as a synonym for *Vancouverensis*, while it seems clear to me that *Vancouverensis* is a synonym for *Drupiferarum*, if my specimen determined by the author of the species is an index.

Dolba Hylaeus, Drury.

This moth is exceedingly common in Southern Indiana, where the larva feeds on the *Asimina triloba*, or Pawpaw. I have taken as many as ten larvæ from a small Pawpaw bush.

Dilophonota Ello, Linn. The description of the preliminary stages of this species given by Prof. Fernald is evidently founded upon Boisduval, who derives it from a figure given by Madame Merian on the sixty-first plate of her work, which Boisduval supposes was intended to represent the larva of *Ello*. The description is exceedingly defective, and in the interest of more exact knowledge I shall venture to give one founded upon a series of beautifully prepared larvæ obtained from my valued correspondent, Dr. Wittfeld, who accompanied the specimens with a number of interesting MS. notes.

Egg.—" Dark green ; deposited on the under side of the leaves of the food plant, which is *Euphorbia heterophylla*." (Wittfeld).

Larva.—The larva presents again the phenomenon of dimorphism, or rather of dichromatism, alluded to in the foregoing note upon *H. Tenuis*. A part of each larval brood is green from the time of the first moult, and a part remains of a purplish brown color, the color of the newly hatched larvæ.

Green Variety.—The head is round and marked on either side by a dark brown line running from the insertion of the palpi to the vertex, and continuing along the dorsal aspect of each segment, gradually diverging until the fourth segment, then continuing parallel until they suddenly converge at the base of the caudal horn. These dark lines are bordered externally by light yellow, shading off into the darker green of the sides and ventral surface of the larva. The space upon the back of the larva enclosed by these lines is delicately sprinkled with dark brown and light yellow spots, the ground color being apple-green, save in the three anterior segments. These segments are of a light olive green between the lines, and are ornamented by a median line of dark brown or black, running from the vertex of the head to the third segment, where it is lost in a large circular black spot, margined externally by bright yellow, outside of which on either side is a shade of deep reddish brown, of a lunular form. The sides of the larva are faintly mottled in the same manner as the back and are further ornamented by small white blotches, disposed one upon each segment just posterior to its junction with the preceding segment, and on a line with the spiracles.

The legs are yellow, annulated with black, the prolegs are black, bordered at their juncture with the segments with yellow, and having the circlet also yellow. The caudal horn is very short and blunt, and distinctly four angled. In one specimen it is almost obsolete.

Brown Variety.—The brown variety does not differ from the green save in color, and the consequent obscuration of the dark lines and markings, which appear less distinct upon the darker ground, and the heightening of the effect of the light spots which come out into bold relief upon the darker surface.

The mature larva is from three to three and a half inches in length and about one-half of an inch in diameter.

The larva pupates near the surface under fallen leaves. The pupa is dark brown. The imago emerges in from fourteen to fifteen days.

The insect is very common in Eastern Florida. I have specimens also from the Antilles, Central America, Trinidad, and Brazil.

Everyx Versicolor, Harris.

The larva of this beautiful moth is found in Western Pennsylvania upon the wild Hydrangea, *Hydrangea arborescens*, which abounds in the deep ravines near streams of running water. The larvæ are either green

or pinkish brown, the brown ones being as numerous as the green. They are peculiarly liable to the attack of parasites, and out of nearly fifty specimens secured in 1884, only nine or ten came to maturity as perfect moths. The rest fell a prey to a species of *Pezomachus*.

Triptogon Occidentalis, Hy. Edwards.

This is a western variety of *T. Modesta*, Harr., differing from the type-form simply in being generally larger in size and paler in color. *Modesta* is found in Western Pennsylvania, Ohio, and Southern Indiana. The examples of *Modesta* from S. Indiana are hardly to be distinguished from specimens of *Occidentalis* from Colorado.

Cressonia Juglandis, Ab. & S.

The larva of this species is commonly found in Western Pennsylvania and Southern Indiana.

PREPARATORY STAGES OF TETRACIS TRIANGULIFERATA, PACK.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Elongate or oval, .03 of an inch long by .025 of an inch wide, ribbed longitudinally like a muskmelon by about 15 ribs; color pale yellowish green. Duration of this period 8 days.

Young Larva.—Length .10 of an inch; cylindrical, with 10 legs; grayish white, without marks except a bright scarlet transverse line across the posterior part of joint 2, jaws the same color, legs concolorous, the six thoracic slightly pink tinted. Duration of this period 6 to 7 days.

After First Moult.—Length .30 of an inch; shape as before; dorsum dark purplish gray, paler in some; on each side a row of five short streaks, slightly lunate, bordered outside with paler, those at the incisures between the joints pale, on each side of joints 8 and 9 a blackish purple patch, the first the largest; venter with one pale and two dark stripes and some spots; head as before. Some examples have the dorsum pale green with a gray shading. Duration of this period 5 days.

After Second Moult.—Length .50 of an inch; cylindrical, near the posterior part of each of joints 6 to 10 are four slight elevations in a

transverse row, those on joint 8 tubercular, the rest small, color vandyke brown, each supporting a minute hair. Color brown, pale on the dorsum of all the joints but 5 and 6, but dark back of the elevations; the sides of the joints from 8 back with more or less vandyke brown patches situated on each side of a dorsal line of dark brown; traces of a stigmatal and subdorsal whitish line; general color of sides and venter yellowish brown, the latter with two broken vandyke brown lines; head brownish, of a honey cast. There is not so much difference in shade as during the former period, traces of subdorsal white lines. Seventeen days after this moult the larvæ began to spin leaves together for their cocoons, without my noting whether they moulted once or twice more.

Mature Larva.—Length 1.50 inches; width of head .06 inch, of middle of joint 7, .10 inch, of posterior part of joint 7 over row of tubercles .16 inch, the width of enlarged portion of succeeding joints .14 inch. Slender, tapering slightly from the head back; head rather flat, the posterior part not higher than the anterior part of joint 2; joint 7 enlarged near its posterior part, where it bears four tubercles; joint 8 enlarged posteriorly, but the tubercles are very small; on joint 9 the two dorsal tubercles a little larger; tubercles on joints 10 and 11 scarcely perceptible, but the two dorsal tubercles on joint 12 prominent. Color yellowish brown, in some places amounting to brownish yellow, marked with umber and blackish or vandyke brown. Head and joint 2 slightly reddish brown; joint 3 yellowish brown with a dorsal brown V on its posterior part; joints 4, 5 and 6 of a little darker shade, the V not so distinct and followed by a brown patch that coalesces with it, more or less of a distinct subdorsal whitish streak; joint 7 with an oblong brown patch back of each dorsal tubercle, a vandyke brown patch on each side mottled with yellowish; within this patch is situated the lateral tubercle; joints 9 and 10 the same as 7, the vandyke brown extending down on the legs; some vandyke brown on joint 11; there is a sub-obsolete dorsal dark line, and all the joints are more or less mottled with brown. Venter with rather distinct stripes, the central one pale, all formed by a mottling of yellowish white and dark, the dark part lighter on the pale stripe than on the others, the white forming an irregular line on each side of this.

Chrysalis.—Length .65 inch, wing and antennæ cases .40 inch, reaching to posterior part of joint 5, cylindrical; depth through joint 1, .15 inch, through joint 4, .18 inch, through joint 5. .17 inch, from this tapering to crenaster; not depressed on joint 1, but gradually tapering from

joint 4 forward, and from this point more rapidly backward; head rounded; tongue and antennæ case extending a little further back than the wing cases. Color pale yellowish brown, faintly mottled with dark reddish brown; a double dorsal row, a pair to each joint, of dark brown patches; a lateral row of the same at the edge of the wing cases on joints 2 to 5; a single ventral row from joint 6 back, and smaller patches scattered over the ventral surface. The wing, tongue and antennæ cases are darker, the ground color slightly darker and the mottlings thicker, so as to be nearly uniform dark purplish brown. Duration of this period from 249 to 282 days.

The eggs producing the larvæ from which this description was taken were obtained from Mr. C. F. McGlashan, Truckee, Cal. The eggs were deposited June 19, 1885, hatching June 25. They began to spin leaves together July 21st, the imagines, three in number, being produced March 27th, April 18th and 29th, 1886, respectively, giving pupal periods of 249, 271 and 282 days, or giving 286, 308 and 319 days from the time the eggs were deposited to the perfect insects. There is a possibility that in this latitude there would be a second brood with a short pupal period, but probably in its home in the Sierras the imagines are produced much later than here, and that there is only one brood.

While in confinement they ate Missouri or Golden Currant *(Ribes Aureum)*. In pupating a few leaves were fastened together within which was a button of silk to which the crenaster was fastened.

NOTE ON CERTAIN SPECIES OF THE GENUS ARCTIA.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

It is only comparatively recently that I have seen the article of Mr. B. Neumoegen upon the genus *Arctia* and its variations, contained in Papilio, vol. 3, p. 148. So far as my own experience and conclusions go, I am, except in two instances which I notice here, generally agreed with the views of this writer. Especially am I of opinion that recently there has been an unscientific and unsound attempt to class as one species

forms of Lepidoptera quite different in appearance, upon insufficient evidence. I have formerly pointed out that Entomologists are naturally divided into two camps: the "lumpers" and the "splitters." For my part I do not at all object to present species being thrown together as varieties, *provided the evidence is complete that they are inter-dependent forms.* What I object to is the hasty manner in which the most of the *lumping* is accomplished in some recent articles, such as Dr. Hagen's on *Papilio* and Mr. Hulst's on *Arctia.* Really if this sort of thing is to go on, we had better stop studying species altogether, considering all the various forms belonging to any one genus as mere varieties of each other, and dispense with naming them. But, since progress is indisputable in all matters, I fancy that in most cases this lumping mania is only the result of the discovery of the extreme variability of certain species and the jumping at the conclusion that it is so with certain other species as to which the necessary proof is as yet wanting. Certain forms described as species of *Arctia* are shown to be varieties, and Mr. Hulst is not satisfied but that *A. Persephone* must be a yellow *A. Virgo* or *A Saundersii.* It has been one of the beliefs of the Brooklyn Entomologists that *Persephone* was a var. of *Virgo*, because my old friend Mr. Graef had a *Virgo* with yellow secondaries in his collection. The two cases in which I disagree with Mr. Neumoegen's list of the species of *Arctia* are as follows:

ARCTIA MICHABO Gr.

This is set down as an aberration of *A. Arge*, which in my opinion is a mistake. At the time I described *A. Michabo*, all authors had followed Dr. Harris in considering *A. Dione* and *A. Arge* as simple synonyms. No one knew of a second species allied to our Northern *A. Arge*, to be separated as a Southern form under the name of *Dione* Ab. & Sm. Therefore it is possible that my species, described very fully in the CANADIAN ENTOMOLOGIST, vol. vii., p. 196, is = this *Dione*, which Mr. Neumoegen now asserts to be different from *Arge.* I cannot compare Abbot & Smith at present. But my *Michabo* is from Nebraska, where Mr. Dodge has reared it and found it entirely different from *Arge*, in a series of specimens. When I read Mr. Neumoegen's paper I at once remembered that I gave him the specimen described by me as a variety or aberration of *Arge* in the same paper above cited, and collected by Mr. Robinson at Brewsters. This is an *undoubted* aberration of *Arge*, and it occurred to me that Mr. Neumoegen has mistaken this aberration of *Arge* for my

Michabo. (By the way, if students would only take the trouble to refer to back numbers of the CAN. ENT., as well as other American publications, some articles would not be necessary ; it is some excuse if the older illustrated works are not at hand, or foreign books, but none if American publications issued within the last 20 years are not gone over by new students). I must therefore strongly protest against *Arctia Michabo* being cited as an aberration of *A. Arge*, while I leave its relationship to *A. Dione* to be settled by those in the possession of the necessary material. In the meantime *A. Michabo* must be considered a good species, being larger than *A. Arge*, and nearer *A. Virgo.* Mr. Dodge will no doubt be able to furnish material to bear out my views. The unnamed aberration of *Arge* which I gave Mr. Neumoegen differs from the typical form in the fore wings being black, the veins alone broadly flesh color, so that the moth has something the look of a species of *Seiraretia.*

ARCTIA NEVADENSIS G. & R.

This species I refer to merely to state that if Mr. Hy. Edwards' *Incorrupta* is a form of the same species, even if more "typical," the above name, being much the oldest, must stand for the whole species, and our designation used only for the variety. When species are first collected it does not usually happen that they are brought in such quantities that in so variable a genus as *Arctia* the "ground form" can be ascertained and described. But it is positively certain that whether the first description cover the more usual or commoner form or not, the name so proposed *must stand for the whole species*, in future and when its limits are more accurately known. Any other course would be manifestly unjust and cause confusion. The species should therefore stand as *A. Nevadensis* G. & R., with its varieties *A. Ochracea* Neum., and *A. Incorrupta* Hy. Edw., as well as *A. Nevadensis* G. & R., for the special form illustrated by us, although I could see no strong differences. Upon one or two other points suggested by Mr. Neumoegen's paper, I could say a word, but the whole genus will soon be better known, and these minor points may well wait.

But I may conclude these remarks with a general observation on the species of *Arctia* described by myself from time to time during the past twenty-five years, since the genus contains very variable species and my own have been subject to frequent criticism.

The forms of *Arctia* which I have described (and for the most part figured) as distinct *species* are: *A. Saundersii*, *Persephone*, *Anna*, *Blakei*, *Nevadensis*, *Mexicana*, *Achaia*, *Michabo*. Assuming that I am correct in my present paper, that Mr. Neumoegen has wrongly identified *Michabo*, then these are all good species except *Anna*, which Mr. Neumoegen considers a black variety of my *Persephone*. In this, which has been before suggested, I believe the author is correct, since we have other black and yellow Arctians (and other moths) which vary in a similar fashion. I have never had sufficient material to determine the question; have never seen but one ♀ *Persephone*, which shared the ornamentation of the ♂. Consequently *Anna* may be a ♀ dimorphic variety. The stripes on fore wings are however narrower and paler also, as they seemed to me, hence my doubts. Added to this, the form *Anna* was *first* discovered by me, before I described the "ground form" *Persephone*. Other two forms of *Arctia* I have described, suspecting them at the time not to constitute distinct species, viz., *Stretchii* and *Snowi*. The first of these, differing only by the basal band of fore wings from *Intermedia*, is without doubt a variety, as Mr. Neumoegen treats it, and I was wrong in cataloguing it as distinct; I do not know, however, the differences between *Intermedia* and *Saundersii*. He considers *Snowi* as distinct from *Figurata* or *Decorata*, and in the absence of further evidence this is the correct course to pursue. In the face of the fact that the larvæ are not all known, we should not be hasty in drawing in forms of *Arctia*, which yet may prove to be only varieties. If we have finally to separate these again, it makes unnecessary confusion. When two forms exhibit such differences as are usually of a specific character, we are warranted in treating them as such, until proof is forthcoming showing them to be mere varieties. Breeding from the egg is the only sure way. On p. 7, Bull. Br. Ent. Soc., Mr. Hulst brings together four species of *Catocala*, with the *naive* remark: "As may be imagined from the above, this *(C. polygama)* is a very variable species"! And this Mr. Hulst did in face of the fact that of two of the forms, *C. polygama* Guen., and *C. crataegi* Saund., the larvæ were known and described quite differently.

NATURAL HISTORY NOTES ON COLEOPTERA.

No. 2.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Harpalus viduus Lec. The type of this species was taken at Rock Island, Illinois. It must be somewhat rare, as it does not appear in any local catalogue nor exchange list under my notice. Here it is found in one place only, and that in some abundance—on the side of a high hill in its primitive state, possessed of a warm, friable, vegetable soil, with a scanty vegetation, and flat stones on the surface. The females have the elytra opaque, but not pubescent, as one of my correspondents claims they should be to meet the description of Dr. Leconte—"*sericeo-opaca*," which here evidently means opaque with a silky lustre. The males are moderately shining. The beetle makes its appearance during September and October, though few of them mature till the following spring, remaining under the shelter of the stones, where from one to half a dozen are often associated. At first the beetles are of a pale color, the elytra gradually changing to black; but the head and thorax mostly remain red till winter. In the spring they are shining black, and are only then fit to be placed in a collection. In the great struggle for "survival of the fittest" the chances seem to be against this insect.

Quedius fulgidus Fab. The descriptive synopsis of the species of this genus by Dr. Horn is so lucid that anyone with a little practice should be able to separate them without trouble, but in some individuals the departure from the normal form is so great and the approach to some other form so close as occasionally to produce perplexity. In the present species, as will be seen by reference to the synopsis cited, the color is so very variable as to be of no separative value, and the principal characters to be depended on to distinguish it from *peregrinus* Grav., which is equally variable, are the shorter, broader head, and the series of three punctures on the thorax external to the discal series. The form with the elytra red is the more common, and usually has the full number of punctures; but a totally black form occurs (legs brown), with the external series often reduced to two, or to the marginal puncture alone, and with the head considerably elongated, thus approximating it closely to black forms of *peregrinus*. When one has a number of both species of normal form to compare with, the determination of these abnormalities can be

made on the general fascies. The length of the antennæ is also of some use, being longer in *peregrinus*, but the relative length of the first and second joints is not permanent enough to be of value. *Fulgidus* is taken more commonly in autumn in and about decomposing vegetable matter. *Peregrinus* abounds all summer everywhere, and is quite arboreal and predaceous.

Dynastes tityus Lin. A gentleman sent me an immature living male and female of this species. They were taken in Clairborne County, Tennesee, early in December, from the decayed wood and humus that filled the cavity of a large yellow poplar, at the cutting down of which he was present. He writes, "there were a great many of them; they were all encased in oblong cases about three to four inches long and three inches in diameter, composed of the rotted wood in which they were imbedded; they were all soft and white; none of the natives had ever seen anything like them." Unfortunately he sent me none of the cases. When received, about three weeks after being taken, the male was assuming the greenish hue, and in three weeks more was normally colored. The female was entirely brown, and in four weeks had changed to nearly black; the black then began to fade, and in about four weeks more the beetle had taken on the greenish tint with the usual brown maculæ. No further change in color has occurred till the present, April 6th. It may be possible that the brown males and females mentioned by writers are immature individuals, as it would appear from the above that it requires from two to three months to perfect the colors. While no real stridulating organs are present, they have the power to produce a sound that may answer the same purpose, somewhat resembling that of an angry goose. The pygidium and part of the last ventral segment are very hairy, and by withdrawing the abdomen from the elytra so as to admit air, and then suddenly forcing it out through the hair by a sudden extension, a noise is produced that is rather alarming to one unacquainted with their harmlessness.

Prionus imbricornis Lin. Nov. 15th, 1884, I found a larva that in time produced this beetle. As it measured over three inches in length when at rest, it must have been nearly full grown; the skin was luteous and of a tough leathery consistence. It was about ten inches below the surface of the ground at the side of a large stone which it had struck in its subterraneous travels. The stone and the larva were carefully replaced

in their original positions. The first week in the following July I visited the place prepared to search for it, and soon found the course it had taken, and by carefully tracing for about eighteen inches, it was at length found inclosed in a cell of tough material, seemingly humus and leafy debris cemented by some secretion of its own. It made quite a large tunnel, eating the roots of the grass that formed a thick sod overhead, and built its cell about three inches below the surface. It was in a meadow, and there were no trees nor stumps near. I brought it home, being careful to not break the cell, and it shortly developed an average sized female *imbricornis*. From this it seems that some of the larvæ of this species of *Prionus*, like those of several *Elateride* species, bore through the earth, feeding on the roots of such grasses and plants as they fancy, which is confirmatory of the observations of Mr. C. V. Riley on the habits of a smaller form, considered a variety of this, that occurs abundantly on the treeless prairies of Illinois and other western States (Missouri Reports 2, p. 89). At the same time it is well established that other larvæ of this species live in both the living and the dead roots of trees, thus showing a large latitude of habit.

Clytanthus albofasciatus Lap. Is raised both from grape vines and from hickory limbs. There are two color forms produced indiscriminately that are so different in appearance that judged by color alone would form two species. The one is entirely black, with the usual anterior and posterior white bands on the elytra; the other is black with the antennæ brown; the part of the elytra anterior to the posterior white band, the femora, the coxal part of the prosternum, the meso and metasternum, rufous. This is exactly the color of the more plentiful form of *Cyrtophorus verrucosus*, and it is not difficult to confuse them. They may be readily distinguished by the compressed thorax and the spines of the antennal joints of the latter, as pointed out to me by Dr. Horn. The same color variation occurs in *Psenocerus supernotatus*. A few specimens of which taken on the wild gooseberry were entirely black, except the usual white markings on the elytra, and so different is the appearance that it required close attention to other characters to be convinced that they were the same species.

Physonata unipunctata Say. Mr. Caulfield, in the March number of the ENTOMOLOGIST, gives a very good account of the form *P. 5-punctata*. Those finding *unipunctata* would do good by making known its food

plant, and if they do not know it, if a sample is sent to me (in bloom if so found), I will be pleased to determine it. It seems to me that it is desirable to have them in collections as varieties, if not species. Besides color, there are two or three structural differences that appear sufficiently permanent to effect this. The black thoracic spot of *unipunctata* is elongate and divided longitudinally by a deep, acute incision; anterior to this is a transverse arcuate impression with the convexity posterior, and more or less apparent; in front of this impression the sides of the thorax have the appearance of having been pinched, so that the dorsal line seems somewhat roundly carinate to the thin apical margin. In *5-punctata* this spot is larger and more broadly oval; in some individuals there is a very shallow depression, while in others it is not observable; anterior to this the thorax is full and convex, without the compressed appearance of the other, and there is no trace of the arcuate impression.

Smycronyx griseus Lec. is often called for, though excessively abundant everywhere, occurring in August and September on the rag-weed of the fields *(Ambrosia artemisiæfolia)*. At first the elytra are clothed with gray pubescence finely mottled with closely placed, minute whitish spots, and the thorax has four pale vittæ; but with age all these mostly disappear, the gray alone remaining. This is the species recognized as *griseus*, though the second joint of the antennæ is scarcely shorter than the first, and nearly twice as long as the third, not agreeing in this with Dr. Leconte's description in the Synopsis. *Brachytarsus tomentosus* is often found plentifully with it, and it may be well to remember that both species may be beaten from the trees and bushes bordering fields in which the weed grows.

Smycronyx tychoides Lec. Is found during August with *Barytychius amœnus*, on a variety of the great ragweed, *Ambrosia integrifolia*, though neither are so abundant as the preceding species. While belonging to different genera, it requires close inspection to separate them if rubbed, or old: *B. amœnus* has the sides of the thorax much rounded in posteriorly, and the disk as well as that of the elytra roundly depressed from the middle to base, which is much below the plane of the disks at middle: while in *S. tychoides* the bases are nearly on the same plane, though the thorax is as much rounded at the sides. The vestiture is of patterns about equally divided among the individuals. The one has a common sutural stripe blackish brown, the rest of the elytra being more or less rufous, and is

easily known ; the other is gray with indeterminate whitish, and requires care to distinguish it ; the most certain mark being the granular punctuation at the sides of the thorax, no other species that resembles it having this form of punctuation. Very few of the species of this genus can be satisfactorily determined from the Synopsis, and to Dr. Horn I am indebted for rendering the identity of the ones treated of certain.

Magdalis Lecontei Horn. The original describer gives its distribution as from Kansas to California and Oregon. To it has been referred a blue or blackish green species, much smaller (.15 to .18 inch.) found here, and of which I have specimens from Eastern Pennsylvania and Canada. While agreeing in having simple claws, non-serrate thorax and dentate femora, a comparison of the two forms shows them to be different. The western form has the back longer and more polished, the thorax more finely punctured, the elytral striæ finer, flat, the intervals broad, finely transversely rugulose with a very distinct row of punctures down the centre of each ; (length, .20 to .25 inch.) The other has the striæ wider and more coarsely punctured, the intervals semi-convex, narrow, coarsely rugose, and the row of punctures nearly obsolete.

Another form with blue elytra occurs on spruce, of which I have seen but one specimen taken here. The thorax is canaliculate and the hind angles more explanate than in *Lecontei.*

A quick method of cleaning greasy Coleoptera, etc. Lately I have employed the following method with the happiest results. It may be old and well known, but I do not remember to have seen it suggested. Dip the insect one half to one minute in spirits of ammonia (Liquor ammoniæ), wash in water (the hotter the better), and the thing is done. Offensive beetles like *Trox*, *Silpha*, etc., can be cleaned and purified instantly. How far the ammonia may be employed in cleaning Lepidoptera and other insects I do not know, but it renewed the beauty of two very greasy specimens of *Cossus Centerensis.*

This liquid also dissolves the verdigris that forms on the pins passed through insects ; but the insect must remain longer in the ammonia and be more carefully washed.

A LIST OF HEMIPTERA HETEROPTERA COLLECTED IN SOUTH LOUISIANA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

Now that we have been supplied by Mr. Uhler with a list of the Hemiptera Heteroptera of North America, which has been much needed, it will be interesting to know more about the geographical distribution of the species. The following list is short, but will nevertheless add to our knowledge of these insects. The species were collected at the same time and in the same localities with the Coleoptera given in my list (CAN. ENTOM., xvii., p. 66–73), and the preliminary notes there given apply also here. The species were kindly determined for me by Mr. Uhler.

PENTATOMIDÆ.

Mineus bioculatus Fab. One specimen taken on plants.*

Podisus sp. The nymphs of two species of *Podisus* were taken on wild plants; one black and reddish, and three smaller of a greenish color.

Euthyrhynchus floridanus Linn. One taken 25th May on plants along the wild side of a ditch, on the edge of a plantation. B. la F.

Ochalus typhœus Fab. Two taken on plants. This species is not given in the Check List.

Euschistus sp. Two nymphs were taken on plants; they are probably two different species, though they look much alike.

Proxys punctulatus Pal. Beauv. Twenty taken, nearly all on 29th March, under dry logs near Lake Pontchartrain, at Milneburg.

Nezara vividula Linn. Two imagos taken 2nd June on plants, and one nymph at another time. B. la F.

Nezara hilaris Say. One nymph taken on plants.

Edessa bifida Say. One taken about first of June, I think, on wild plants. B. la F.

COREIDÆ.

Metapodius granulosus Dallas. Numbers taken on thistles and other plants along ditches on plantations, and in other open sunny places. N. O.; B. la F. This is probably not the species so

* Where no locality is given it may be either, but is probably B. la F. Where no date, it is unknown, unless the species was more or less abundant during my stay.

often mentioned and figured in agricultural reports (first by Glover, U. S. Agr. Rep., 1855, p. 95, pl. viii., fig. 9) as *M. femoratus*, but it is nevertheless found in just such situations as are given for the latter, and is the only species I met with in the South. The locality of this species is given in the Check List as the Western States.

Leptoglossus phyllopus Linn. Numbers taken on thistles and in much the same places as the preceding. N. O.; B. la F.

LYGAEIDÆ.

Myodocha serripes Oliv. One taken under old wood?

Melanocoryphus bicrucis Say. Four taken on plants in May. B. la F. This species I have also taken in Kansas and Michigan.

PYRRHOCORIDÆ.

Largus succinctus Linn. Fifteen taken in April on leaves of young shrubs of elder on a plantation. *In coitu*, 21st April. B. la F. This is no doubt the species referred to and figured by Glover (U. S. Agr. Rep., 1855, p. 94, pl. viii., fig. 7) as the "Red-edged-winged Reduvius," as his description applies well to this insect.

PHYMATIDÆ.

Phymata erosa H. Schf. Three taken on some roadside weeds in May. B. la F. The locality of this species was formerly given as Mexico.

REDUVIDÆ.

Zelus bilobus Say. One taken 22nd May on ragweed. B. la F.

Apiomerus sp. A larva taken under old wood?

Sirthenea carinata Fab. Three taken in April under logs in damp places on the edge of the swamp. N. O.

Rasahus biguttatus Say. Four nymphs taken in April under logs in same places as the preceding species. N. O.; B. la F. The locality of this species was formerly given as the Western States.

Melanolestes picipes H. Schf. Six taken in April in same places with the two preceding. N. O. Have also taken this species in Kansas.

Conorhinus variegatus Drury. One nymph taken with the preceding species. N. O.

GALGULIDÆ.

Galgulus oculatus Fab. One taken in slow water in April. N. O.

BELOSTOMATIDÆ.

Zaitha sp. Three taken 17th April in slow water; another was taken also, which was being devoured by a specimen of *Cybister fimbriolatus* Say, all the under part of the abdomen having been eaten away. N. O.

Belostoma americanum Leidy. This species has been noticed by Mr. L. O. Howard (Ent. Amer., I., p. 54) as very abundant in New Orleans, being attracted to the electric lights. I have also referred to this fact in a note in No. 8 of Vol. I. of the same journal.

PARTIAL PREPARATORY STAGES OF APATELA LOBELIÆ, GUEN.

BY G. H. FRENCH, CARBONDALE, ILL.

Found feeding on a wild cherry, September 19, 1884, two larvæ of this species. They were .80 of an inch long, nearly cylindrical, the body somewhat elevated in the middle, from which it tapers a little both ways, the dorsum of joint 12 with a slight elevation; eight low tubercles on each joint, from each of which arise a few spreading white hairs. Color green; a dorsal stripe that is mostly red on joints 3 and 4, and on the elevated portion of joint 12, the rest of the stripe yellow with a reddish blotch to each joint; the anterior part of dorsum of joint 2 red, separated by green in the middle, yellowish round the edges. Head slightly bilobed; the lower part reddish green, the upper part more red.

September 24th, they moulted when they were 1. inch long, the same shape as before. Color dark blackish brown, with a magenta dorsal line bordered each side with black, and a patch of the same color on the top of each lobe of the head. The dorsum of joint 2 is pale instead of magenta. Each joint has twelve small orange tubercles, each supporting a spreading tuft of gray hairs. They pupated October 1st, producing two imagines May 10th and May 19th, 1885. These are interesting larvæ in both of their last larval stages, as the colors are bright. The cherry upon which they fed is the common wild black cherry, *Prunus serotina*, the larvæ resting when found on the upper side of the leaf.

OBITUARY.

We deeply regret to announce the death of Mr. William D. Shaw, of Montreal, on the 29th of June, 1886, at the early age of 19 years. The deceased was well known for his early application to science, he having been the leading spirit in founding the Montreal Chapter of the Agassiz Association. Of this Chapter Mr. Shaw was Secretary and Treasurer, and in 1885 was appointed General Secretary for Canada. Mr. Shaw was also a member of the Council of the Montreal Branch of the Entomological Society of Ontario, a member of the Natural History Society of Montreal, and a member of the Astro-Meteorological Association. A devoted student of science, his loss will be deeply felt by his fellow workers. Unassuming, guileless and upright, his memory will ever be held in loving remembrance by those who had the privilege of knowing him.

CORRESPONDENCE.

ON EXPLOSIVE EMISSIONS FROM CARABIDÆ.

Dear Sir: There are other Carabidæ in our fauna which make an explosive emission from anal glands besides *Brachynus*. Mr. Ricksecker has observed the same in *Metrius*, and while I have taken these, I have never been so fortunate as to observe that act. The same is, however, done by *Psydrus piceus*. Many of our Carabide genera emit forcibly an irritating liquid, decidedly acid in its reaction, but without any explosive noise or with visible vapor; among these are *Cychrus*, *Calosoma*, *Carabus*, *Nomius* and *Chlaenius*. It is possible that *Calathus* does the same, as stated by Mr. Townsend, but the "white smoke" observed is probably the result of a chemical combination between the vapors in the cyanide bottle and the acid exudation, similar to that noticed when the vapors of hydrochloric acid and ammonia meet. Many of these exudations are not unpleasant to the smell, but in *Nomius* the offensiveness of the odor is entirely disproportionate to the size of the insect.

Philadelphia, April 28, 1886. GEORGE H. HORN, M. D.

A CORRECTION.

Dear Sir: I described in the CANADIAN ENTOMOLOGIST, June, 1885, vol. xvii., p. 115, a new Ichneumonid for which I created the new genus *Platysoma*. But advised by my friend, Mr. E. T. Cresson, I recognized that this name was pre-occupied for a Coleopterous insect of the family Histeridæ. I propose in consequence to change this name in that of *Aplomerus* (from *aplous* simple, and *meros* thigh). Thus, *Platysoma tibialis* must be read *Aplomerus tibialis* Prov.

Cap Rouge, April 15th, 1886. L. PROVANCHER.

BOOK NOTICE.

The Butterflies of the Eastern United States: By G. H. French, A. M.

This book is indicative of the progress lately made in Zoology, and particularly in Entomology, in that such work is possible, and that it is appreciated. In a plain, simple, and still complete and thorough way, it presents the facts known about a large and distinct group of living objects, which attract the interested attention of every lover and student of nature. The first question which a student asks of a newly found object is, "What is it?" If the object comes within the scope of this volume, this question will be answered easily and satisfactorily. The work has been done carefully and well. The writer has shown his good judgment quite as much in what he has left out, as in what he has put in his book. He has wisely accepted the work which the great body of Entomologists has done before him. He has not felt that a woe rested upon him if he failed to revise, which commonly means to ignore all such work. He has not tried to create a chaos and call it science. He has evidently preferred to present the facts of his subject, rather than to display himself. For what he has done, and for what he has omitted to do, he deserves thanks. The volume is well printed, and its many illustrations, though in many cases familiar, are still the best extant. While we recognize their abundance, we still wish there were more, and hope that it will at some time be possible to figure in such a book every species mentioned. We trust that this work will be followed by others equally meritorious in every division of the wide Entomological field. S. H. PEABODY.

The Canadian Entomologist.

VOL. XVIII. LONDON, JULY, 1886. No. 7

PROF. FERNALD'S SPHINGIDÆ OF NEW ENGLAND.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

This very carefully written pamphlet brings us quite a step forward in our knowledge of the structure of our Hawk Moths. In the first place, it may be doubted whether the divisions of the Sphingidæ, first laid down in their present shape in Grote & Robinson's Synonymical Catalogue (1865), are not of lower rank than sub-families, but as all our divisions are based on comparative characters, this point need not detain us long. I had diligently searched the literature for older terms for these groups, finding them in part, but they were not adopted by Butler, and the terms of our Catalogue of 1865 with a sub-family ending seem to be preferred. I commenced with the Macroglossinæ, because these genera more resemble the Hesperidæ in their frequent diurnal flight, pupation on the ground between leaves with a few threads of silk, and in the more prismatic antennæ. Our genera are *Hemaris*, *Aellopos*, *Euproserpinus* and *Lepisesia*, with entire wings. I never was so fortunate as to possess any specimens of the genera *Lepisesia* or *Pogocolon*. Twelve years after describing *Lipisesia* from a specimen in Coll. Phil. Ent. Soc., another species of *Lepisesia* was sent me for determination from Cambridge, where accordingly my type of *L. Victoriæ* now is. This species is said to be the same as Boisduval's *Pogocolon Clarkiæ*, unknown to me. We have then at least two species of *Lepisesia*. I only know Abbot's figure of *Gauræ;* this represents a species with angulated wings, looking a little like the European *Œnotheræ*. In the Central Park Coll. is or was a specimen belonging to Mr. Robinson, brought by Mr. Ridings from Georgia. I thought, after only casually examining it, that it might be an allied species or a variety; but I never had it in my possession long enough to study. Nor do I know any of Mr. Hy. Edwards' species. Whether these are true *Pogocolon*, or whether this genus is distinct from *Lepisesia* (which is much the older term), I cannot at all say. But having

compared *Euproserpinus* I am satisfied that this is not *Lipisesia;* it is made a distinct section of *Macroglossa* by Boisduval; it is our nearest genus to *Macroglossa*. I have compared *M. stellatarum* with the species of *Hemaris*. Not only the opaque wings, but the vestiture, tuftings, head, neuration, give comparative differences which I set down as generic. It has been one of my studies, and I believe I am even the first writer to correct the statement that the European *Hemaris* has a *vein* on the cell; on removing the bar of scales I found no vein as described in European text books of ten or more years ago. We have no true *Macroglossa* and no true *Acherontia* in North America, though both are asserted. The remaining genera have the wings angulate, except *Arctonotus* and *Cautethia*. These are: the genus to which *gaurae* belongs, *Amphion*, *Thyreus* and *Deidamia*. If Prof. Fernald will examine the primaries of these three last genera, he will find them very like, also the body tuftings, though the abdomen is elongated in *Deidamia*, and has lost the plump typical Macroglossian form. But the larva has not the cordate head of *Smerinthus*, and I cannot class the moth with this latter, notwithstanding what Butler says. The fact that *Deilephila* also pupates like the first group and does not enter the ground, that the flight is often diurnal, the colors vivid, make me bring the *Chœrocampini* in here. It is a noticeable fact that the lower genera of the Macroglossinæ and many Chœrocampinæ feed on the grape. I have nothing to say upon these genera of the second group except that I believe *Ampelophaga* to be older than *Everyx;* if therefore *Myron* and *Versicolor* are congeneric, they may both be referred to this genus of Bremer's; while for *Chœrilus* we may retain *Everyx*. Having studied extra-limital Chœrocampid forms with angulated wings, I discovered an *Ambulyx* from Brazil with eye-spots like a *Smerinthus*, and I look upon this genus as a sort of passage to the Smerinthinæ in consequence, aided by the sunken head, brown colors with roseate patches, etc. The Smerinthinæ feed as larvæ on fruit and nut trees. We have one true *Smerinthus*, congeneric with *ocellatus* of Europe, viz., *ophthalmicus* from California. Then we have a type which deviates in small details and is represented by *geminatus*, having a representative in Asia Minor, as Butler tells us. Prof. Fernald points out that *Cerisyi* agrees with *Calasymbolus Astylus* in antennal structure, but I never saw *Cerisyi*, which, from the figure of Kirby, seemed to me like *geminatus*, with which, if I remember rightly, Kirby compared it. Probably there is nothing like *Astylus*, *Cerisyi* or *myops* in the Old World, and it would be

well if we accordingly restricted *Smerinthus* to the Californian species and separated our Eastern forms under *Eusmerinthus* and *Calasymbolus*. I used *Paonias* for *Excaecatus*, which differs by the scalloped wings. Also *Cressonia* for *juglandis*, correcting Dr. Clemens' notion as to the European *Populi*, which represents neither *juglandis* nor *modesta*, though nearer the latter. *Cressonia* is as distinct a genus as we have in the whole family. *Triptogon* is largely represented in Asia. I follow now with the Sphinginæ, which enter the ground to pupate, commencing with *Ceratomia*, which in its larva approaches *Triptogon* and is a peculiar American form. I follow then with *Daremma*, *Diludia*, *Pseudosphinx* (= *Macrosila* Butler), *Amphonyx*, *Phlegethontius*, *Dolba*, *Sphinx* (= *Lethia*), *Dilophonota*, *Hyloicus*, *Ellema*, *Exedrium*. I do not believe these latter to be Smerinthinæ, but low bombycoid Sphinginæ. This group feeds especially on the Solanaceæ, also Convolvulus and Privet. The tongue is often attached, like a jug handle, as Prof. Fernald says, to the pupa, which reposes in a naked cell under ground, the larva rolling the soil about it compact. I am glad Prof. Fernald uses *Phlegethontius*, which has priority and is a clean genus against which nothing can be said. If we study these insects carefully, I am sure we will finally accept all the genera, or nearly all, I have proposed. It is unwise to lose sight of the very clear characters which have been so well discussed by Prof. Fernald so far as his very readable pamphlet goes. I think when the extra-limital and especially South American forms are studied by the Professor, he may incline to place the Sphinginæ where I have placed them. I have been guided by their subterraneous pupation, their gray colors like the lower moths. The Macroglossians and the Chœrocampians are gayer colored, day loving, active species. How often have I not taken *Lineata*, and also *Pandorus*, at midday. I am glad to see that my use of *Pandorus*, which was made after careful comparison with the true *Satellitia* of Linné, is being sanctioned. The reading of Prof. Fernald's pamphlet has given me great pleasure, and I should be affected and ungrateful not to acknowledge it. But it will have, with all that this author has given us that I have yet seen, a far more important value than the mere vindication of this or that name in our lists. It will show how much there is yet for us to learn about our moths, and also the way to learn it.

NOTES ON AN UNDETERMINED LEPIDOPTEROUS LARVA.

BY IDA M. ELIOT AND CAROLINE G. SOULE, STOWE, VERMONT.

We have found a caterpillar which we cannot identify, nor can any one to whom we have shown the description and a water-color drawing. "Papilio," Vol. iii., No. I., p. 14, has a description which is nearest it, but is not exactly like our larva, as ours has no tufts.

Our first specimen was found Sept. 12th, 1883, and our last one Aug. 13th, 1886. Between these we have three others; all of them pupated, but none emerged.

The larva is 1½ inches long; the head is brownish-green with a whitish bloom over it; mouth parts dark; no marks or hairs.

The body is almost evenly cylindrical, tapering very slightly towards the head; green in color, very smooth, firm, and free from markings and warts, and evenly covered with long, silky hairs, cream-white in color, and growing singly, without warts or tufts which could be seen even with a powerful lens. The hair turns towards the head, and droops in a beautiful curve over the sides, almost as if parted on the dorsal line. There are a very few short black hairs, not noticeable unless looked for, scattered on the last three segments. The feet and props are green, a little brownish at the tips. Spiracles are white and inconspicuous.

The larvæ were found, three on white birch, and one each on willow and poplar, all being curled around on the under side of leaves. In this position it always rests, with the head covered by the drooping hairs, and looks like a downy white feather. It is very beautiful and conspicuous on the tree, where it is always on one of the lower branches.

It is wholly different in appearance, and in the arrangement and quality of the hair, from the Apatelas, Lophocampas, or Arctians, or any of our common hairy caterpillars, and some of its habits also differ from these. Resting on the leaf-stem and beginning at the edge of the leaf, it eats into the middle, leaving the margin except where it began; or it rests near the stem, aud eats the leaf all around, leaving only the part on which it is resting.

None of our specimens moulted, but just before pupation every one changed color, the body being olive brown, and the hairs dull black. On the day following this change the larva began to bore into a piece of rotten wood, entering head first, then backing out with the bits of wood it

had dug out collected between the props. When outside it opened the props and dropped the bits of wood. This operation was repeated until the hole was large enough, when the caterpillar entered for the last time, leaving its black hairs at the entrance.

The last one made but one opening to the hole, and did not, as far as we could see, spin a door across. Three of the others made openings at each end, and closed both with silk and hairs. The first one was kept in a paste-board box, and, no wood being given to it, gnawed a hole through the box. When we covered this hole, the caterpillar spun against the side of the box a thin cocoon of silk mixed with the bits of paste-board gnawed from the box. None of them would go into the earth when it was provided for them. The pupa of the second one was kept for two years, but showed no sign of life, and was then thrown away.

We should be very glad of any information about this larva that any readers of the ENTOMOLOGIST can give.

COLEOPHORA LARICELLA HB. VERY INJURIOUS TO LARIX EUROPEA, IN MASSACHUSETTS.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Professor Sereno Watson communicated to me some twigs cut on the grounds of Mr. Henry Watson, in Northampton, Mass. Several *Larix Europea* about thirty years old stand on an avenue, and have never suffered before. In April they showed to a large extent pale needles and many little larvæ of the well known sac-bearing form. In May numerous slate-colored moths appeared, the true *Coleophora laricella* Hub. This insect in all its stages is well described in Stainton's Nat. Hist. Tineina, vol. iv., p. 1, and figured on pl. i., f. 2. It would be useless to give a description here. Our biological collection possesses types of all stages by Rosenhauer, Zeller and Hofmann. As far as I know, it has not yet been observed in the United States. Some twigs given by the late J. Boll were perhaps collected in 1872 in Cambridge, Mass.; but as he did not mark any locality on the label, I am not sure that he did not bring them over from Europe. I am not able to find any published notice in North American papers. I may notice that the caterpillar keeps its abode very clean by expelling the fæces out of a hole in the needles.

Ratzeburg Waldverderbniss, Ton I., speaks at some length about the injury done by the insect. There is till now no remedy known for the insect, as the caterpillar is well protected in the needle.

This year *Chernes laricifoliæ* A. Fitch, Rep. 4, No. 289, is very common in the Arnold Arboretum here. I do not find the species mentioned except by A. Fitch, of which Prof. Packard gives a copy.

EMBIA MINUTA, Costa.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

I am indebted to Sc. E. Bergroth, Helsingforz, for knowledge of this species. Prof. A. Costa has published, Atti della R. Accad. Sc. fisiche, etc., vol. vii., 1878, Napoli No. 2, the account of his journey through Egypt and Palestine. He was (p. 11) very interested to find, Feb. 17, after Assouan, at Kom-Ombos, on irrigated and humid grounds, a very small (long. corp. 5 millim.) species of Embia, for which he proposes the name *E. minuta*. As far as I know, nothing more has been given about this insect, and we will have to wait till Prof. A. Costa will publish its description. *Oligotoma Westwoodi* is the only species known of such small size, but it has only been found in copal.

A LIST OF THE NORTH AMERICAN SPHINGIDÆ, OR HAWK MOTHS.

BY A. R. GROTE, A. M.

The present List of the North American Sphingidæ or Hawk Moths embraces the principal features of my former Lists, in particular the division into groups, retained by Butler and lately by Fernald. I have originally in our Synonymical Catalogue (1865) proposed the genera *Macroglossa*, *Chœrocampa*, *Smerinthus* and *Sphinx* as typical of the four principal groups recognized by me. A fifth group, represented by the Old World genus *Acherontia*, seems to me to fall in between the Smerinthinæ and Sphinginæ. It seems to me unimportant whether we consider these groups as Tribes, with the ending *ini* to the terms, or as Subfamilies,

with the ending *inæ*. I am myself of the opinion that these divisions are only of tribal value, and should prefer to so designate them. But, under this view, the Family Sphingidæ, as here considered, would remain only of Subfamily value, somewhat as intended by Dr. Harris, whose "tribes" have a wider significance, whereas I intend by "tribes" assemblages of genera subordinate in rank to Subfamilies, and as intended by LeConte in Coleoptera. These matters must be left, however, to final revisions of our classification. At this moment I am interested, in view of Prof. Fernald's recent valuable paper, in defending my sequence of the genera and groups as laid down in my former papers.

I have commenced with the Macroglossinæ on account of their diurnal flight, the frequent use of silk in the pupation, the fusiform antennæ, characters which ally the moths to the lower butterflies. I have, since 1865, pointed out that the European *Macroglossum stellatarum* is the type of a distinct genus from *Hemaris;* it is an Old World genus containing several species and differing from a large number of partially vitreous allies, by the abdominal tufts, the comparatively stouter antennæ, the thicker palpi, different vestiture, besides the thickly scaled wings. I denuded the wings of these forms, discovering that V. Heineman's statement that the cell of *Bombyliformis* was crossed by a vein, to be incorrect, the bar being formed by scales only, and found certain slight neurational characteristics which I no longer can refer to. The neuration of *Lepisesia* is figured in my Sphingidæ of Cuba, p. 6 (1865).

The characters of the Family Sphingidæ are the narrow wings, the primaries long, the secondaries short; the frenulum is present; the fringes short, vestiture scaly and close; there is a general absence of tuftings and all impediments to a swift and continuous flight. The abdomen is heavy, long, usually tapering, the segments armed. The head is prominent, ocelli wanting, eyes naked, large; antennæ prismatic, maxillary palpi wanting, labial palpi thick, tongue variable but usually well and even excessively developed. Pupation sometimes on the surface in a slight web, but oftenest in the ground without cocoon. In the higher genera of the first Subfamily the wings are entire, in the lower, *Thyreus*, *Deidamia*, etc., angulated. These lower genera of the first Subfamily approach the Chœrocampinæ, and I cannot interpolate here the Sphinginæ. The larvæ feed also on the grape and *Ampelopsis;* the young of *Thyreus* are comparable to *Philampelus* in the loss of the caudal horn and the assumption of a tubercle. While the larvæ of *Hemaris*, etc., feed in preference on

Viburnum, Vaccinium, Lonicera, the genera with angulated wings and the Chœrocampinæ generally are grape-feeders. *Everyx* and *Ampelophaga* spin surface cocoons like *Hemaris.* The colors of the lower Macroglossinæ are brown and green, with here and there light yellow, as on the secondaries of *Danum* and *Abbotii.* Claret red, olive green, sericeous yellow, are the tints of the first two Subfamilies, with rich browns and hard red tints ; the gray colors of the Smerinthinæ and especially of the typical Sphinginæ are not as yet displayed. I think that, from the pupation, *Everyx* is higher than *Philampelus,* while from a structural study I have formerly brought *Deilephila* and *Philampelus* together. I merely remark here that in reference to recent statements, I do not know Abbot & Smith's *Gauræ,* nor any of the species with angulated wings referred here to *Pogocolon.* I had only examined and described the two species of *Lepisesia,* while from figures I should judge Abbot's species belonged to a different genus. While the higher genera of the Chœrocampinæ have the wings entire, often falcate, the lower have them angulated, and in the genus *Ambulyx* we have a species with ocellated secondaries. The colors become rich tints of gilded brown and yellow ; roseate hues obtain largely and the spots on the secondaries prepare us for their final expression in *Smerinthus.* The ornamentation of the thorax in *Smerinthus* recalls *Philampelus, Ambulyx.* Although, on general grounds, I would admit that the Bombycid analogies of the Smerinthinæ lower them in the rank in the family, I believe the nearest approach to them at present existing is the genus *Ambulyx* among the Chœrocampinæ. The frequently pink secondaries in *Ambulyx* prepare us for the usually pink hind wings in the Smerinthinæ. Every indication from color, pattern and shape of wing, favors the idea that the two Groups, Chœeocampinæ and Smerinthinæ, are related. This is the main point of my arrangement of the imagoes, and I believe the known larvæ sustain this view of the relationships within the Family. The real gray colors only obtain as a rule within the Subfamily Sphinginæ ; the Smerinthinæ are gray, tempered with brown shadings and with pink discs to the secondaries, as we see in some other moths, such as the Dryocampæ. The most splendidly ornamented Hawk Moths are to be found in the Chœrocampinæ, radiant in rich golden yellows and olives, and some Asiatic species are marvels of beauty. The larvæ of the Smerinthinæ feed by preference on fruit and nut trees. The larvæ of the Acherontiinæ and Sphinginæ on plants belonging to the

Solanaceæ (Tobacco, Tomato, Potato, Deadly Nightshade, etc.) A few species, such as *Paonias Excæcatus*, may be almost considered polyphagic; but, generally, the species are pronounced in their preference for special genera or families of plants. At last the gaudy colors yield to gray, in the Smerinthinae, suffused with rich brown and with pink shaded secondaries; the dull gray and blackish species at the most only relieved by yellow spots on the body in the Sphinginae. A few species have warmer tints, but the resemblance to the gray Noctuidae becomes now apparent and the gay colors of the Chœrocampinae do not again appear. The pupation is subterranean, the cocoon wanting, the flight crepuscular and even nocturnal. After a very diligent study of foreign genera, which we must always consider, I think the naturalness of the sequence as proposed by me cannot be gainsayed. There may be a better sequence for the genera here and there, within the groups, to be attained, but that the groups do thus better arrange themselves in a linear series, I am convinced, not leaving out of sight the fact that the relationship is net-like and not to be truly expressed by a straight line. As to particular points, I believe *Ampelophaga* is older than *Everyx*, which latter I retain for *Chœrilus* with its spined tibiæ. I believe *Deidamia* to be allied to *Thyreus* by the shape of the wings. I follow Butler's extension of *Calasymbolus*, leaving *Eusmerinthus* as a subgeneric title for *Geminatus* with its bi-pectinate male antennæ. Our only true *Smerinthus*, as originally pointed out by me, is from the West Coast, but I believe the Californian species has also occurred in Upper Canada. We have in South Florida a West Indian colony, the extent of which is not yet known. Stragglers from the south, as *Ello*, *Titan*, *Labruscæ*, invade even New England. How far north these breed with us, is not known. They seem hardly to belong to the North American Fauna, but are all included here so far as they have been reported to me as being taken within the political limits of the United States.

In this list I have followed with a dash (—) all species not known to me in nature. (I trust my critics will observe these signs.) I have also used the sign ‡ to denote erroneous identifications. In the localities of the species known to me I have tried to express my idea as to their distribution.

Family SPHINGIDÆ.

Sub-family MACROGLOSSINÆ.

Genus *Hemaris* Dalman.

1. Palpalis *Grote.* California.
2. Thetis *Boisd.* California.
3. Cynoglossum *Hy. Ed.*—
4. Rubens *Hy. Ed.*—
5. Senta *Streck.*—
6. Aethra *Streck.*—
7. Tenuis *Grote.* Can., N. Y.
   Fumosa Streck.
8. Diffinis *Boisd.* N. Y., southward.
9. Marginalis *Grote.* Ohio, south and west.
10. Axillaris *G. & R.* Texas to Ill.
    Grotei Butl.
11. Metathetis *Butl.* 1 —

(Subgenus *Chamæsesia* Gr.)

12. Gracilis *G. & R.* Maine; N. Y.

(Subgenus *Hæmorrhagia* G. & R.)

13. Thysbe *Fabr.* Can., southward.
    Pelasgus Cram.
    dim var. Uniformis *G. & R.*
    (?) *var. min.* Buffalœnsis *Gr.*
    (?) *var. maj.* Floridensis *G. & R.*
14. Fuscicaudis *Bosid.* Georgia.

Genus *Aellopos* Hübn.

15. Titan *Cram.* Florida, northward.
    Annulosum Swains.
    Balteata Kirtl.
16. Tantalus *Linn.* Florida, northward.

1. How many of these eleven species, belonging to the typical group of *Hemaris*, are really distinct, it is difficult to say, and there must be careful breeding from the egg to decide. In collections *Tenuis* is usually labeled *Diffinis*, but the latter, from Abbot's and Boisduval's figures, differs in several points. Since Mr. Hulst has shown that *Uniformis* is only a dimorphic form of *Thysbe*, the value of the terminal band of primaries as a specific character becomes doubtful.

Genus *Euproserpinus* G. & R.

17. Phæton *G. & R.* California.
Erato Boisd.

Genus *Cautethia* Grote.

18. Grotei *Hy. Ed.* Florida, Cuba.

Genus *Arctonotus* Boisd.

19. Lucidus *Boisd.* California.

Genus *Lepisesia* Grote.

20. Flavofasciata *Barnst.* Can., N. Y.
21. Clarkiæ *Boisd.* California, etc.
Victoria Grote.

Genus *Pogocolon* Boisd.

22. Circeae *Hy. Edw.*—
23. Gaurae *Abb. & Sm.*—
var. Juanita *Streck.*—

Genus *Amphion* Hübn.

24. Nessus *Cram.* Can., southward.

Genus *Thyreus* Swains.

25. Abbottii *Swains.* Can., southward.

Genus *Enyo* Hübn.

26. Lugubris *Linn.* Florida, northward.
27. Camertus *Cram.* Florida, northward.
28. Danum *Cram.* Florida, northward.

Genus *Deidamia* Clem.

29. Inscripta *Harris.* Can., southward.

Sub-family CHŒROCAMPINÆ.

Genus *Everyx* Boisd.

30. Chœrilus *Cram.* Can., southward.
Azuleæ A. & S.

Genus *Ampelophaga* Brem.

31. Myron *Cram.* Can., southward.
Pampinatrix Ab. & Sm.
var. Cnotus *Hübn.*
32. Versicolor *Harris.* Can., southward.

Genus *Chœrocampa* Dup.

33. Tersa *Linn.* Southern States, northward.

Genus *Deilephila* Ochs.

34. Chamaenerii *Harris.* Can., southward.
Canadensis Guen.
? Intermedia Kirby.
? Oxybaphi Clem.
35. Lineata *Fabr.* East to west.
Daucus Cram.

Genus *Philampelus* Harris

36. Vitis *Drury.* Southern States.
Fasciatus Sulz.
Jussienaeæ Hübn.
37. Linnei *G. & R.* West Indies, Fla., Ga.
Vitis ‡ Cram.
38. Pandorus *Hübn.* Can., southward.
Satellitia ‡ Harris.
39. Posticatus *Grote.* West Indies, Fla.
Lycaon ‡ Gr.
40. Achemon *Drury.* East to west.

Genus *Argeus* Hübn.

41. Labruscae *Linn.* West Indies, northward.

Genus *Pachylia* Walk.

42. Ficus *Linn.* West Indies, northward.
Crameri Mèn.

43. Syces *Hübn.* West Indies, northward.
Inornata Clem.
Ficus ‡ Mèn.
44. Lyncea *Clem.* —

Genus *Ambulyx* Walk.

45. Strigilis *Linn.* 2 West Indies, Fla.

Sub-family SMERINTHINÆ.

Genus *Calasymbolus* Gr.

46. Astylus *Drury.* Can., southward.
Io Boisd.
Integerrima Harr.
47. Myops *A. & S.* Can., southward.
48. Cerisii *Kirby.* Can., Maine, N. Y.

Subgenus *Eusmerinthus* Gr.

49. Geminatus *Say.* Can., southward.
var. Jamaicensis *Drury.* —

Genus *Smerinthus* Latr.

50. Ophthalmicus *Boisd.* California.
var. Pallidulus *Hy. Ed.*

Genus *Paonias* Hübn.

51. Excaecatus *Ab. and Sm.* Can., southward.

Genus *Cressonia* G. R.

52. Juglandis *Ab. and Sm.* Can., southward.
♀ *Pallens* Streck.
var. maj. Robinsonii *Butl.*

2. This species, *Phil. Posticatus*, *Amph. Duponchel*, have been reported to me from South Florida, but I have seen no specimens. The same is true of *Macrosila Ochus*, reported to me from South Texas. It is probable that most of the Cuban Sphingidæ may occur sporadically on our shores.

Genus *Triptogon* Brem.

53. Modesta *Harris.* Can., southward.
Princeps Walk.
Cablei Von Reiz.
54. Occidentalls *Hy. Ed.* California, etc.
Imperialis Streck.

Subfamily SPHINGINÆ.

Genus *Ceratomia* Harris.

55. Amyntor *Hübn.* Can., southward.
Quadricornis Harr.

Genus *Daremma* Walk.

56. Undulosa *Walk.* Can., southward.
Brontes ‡ Boisd.
Repentinus Clem.
57. Hageni *Grote.* Texas.
58. Catalpae Boisd. Southern States.

Genus *Diludia* G. & R.

59. Jasminearum *Boisd. and Lec.* Ga., northward.
60. Leucophaeata *Clem.* —
61. Brontes *Drury.* —

Genus *Dolba* Walk.

62. Hylaeus *Drury.* Southern States, northward.
Prini A. & S.

Genus *Amphonyx* Poey.

63. Antaeus *Drury.* West Indies, Fla.
64. Duponchel *Poey.* West Indies, Fla. (?)

Genus *Phlegethontius* Hübn.

65. Rustica *Fabr.* Southern States.
Chionanthi A. & S.

66. Ochus *Klug.* Mexico, Tex. (?)
Instita Clem.
67. Carolina *Linn.* West Indies to Can.
68. Celeus *Hubn.* Can. southward.
5-maculata Steph.
Carolina ‡ Harr.
69. Cingulata *Fabr.* Southern States, northward.
var. Decolora *Hy. Ed.*

Genus *Hyloicus* Hübn.

70. Plebeius *Fabr.* Can., southward.
71. Sequoiae *Boisd.* —

Genus *Ellema* Clem.

72. Bombycoides *Walk.* Can., southward.
var. Harrisii *Clem.*
73. Coniferarum *Ab. and Sm.* Southern States, northward.
74. Pineum *Lintn.* —

Genus *Exedrium* Gr.

75. Halicarnie *Streck.* —

Genus *Sphinx* Linn.
(= *Lethia* Hübn.)

76. Drupiferarum *Ab. and Sm.* Can., southward.
var. Utahensis *Hy. Ed.* Utah.
77. Kalmiae *Ab. and Sm.* Can., southward.
78. Chersis *Hübn.* Can., southward.
Cinerea Harris.
79. Oreodaphne *Hy. Ed.* —
80. Libocedrus *Hy. Hd.*—
81. Perelegans *Hy. Ed.*
82. Vancouverensis *Hy. Ed.* West Coast.
Vashti Streck.
83. Canadensis *Boisd.* Can., southward.
Plota Streck.
84. Gordius *Cram.* Can., southward.
85. Albescens *Tepper.* —

86. Luscitiosa *Clem.* N. Y., Maine, N. J.
87. Lugens *Walk.* Western States.
Eremitoides Streck.
88. Eremitus *Hübn.* Can., southward.
89. Separatus *Neum.* —
90. Dollii *Neum.* —
91. Elsa *Streck.* —

Genus *Dilophonota* Burm.

92. Ello *Linn.* West Indies, northward.
93. Melancholica *Grote.* West Indies, northward.
94. Merianae *Grote.* West Indies, Mex., Tex.
95. Festa *Hy. Edw.* —
96. Obscura *Fabr.* Southern States.
97. Edwardsii *Butler.* —

BROTIS VULNERARIA Hubn.

BY GEO. D. HULST.

In the Canadian Entomologist, this volume, p. 72, Mr. Ph. Fischer tells us of the capture of the above moth at Buffalo, N. Y., adds something of the bibliography of the species, and remarks upon its aberrant appearance and character. Permit me to add a few words to what was there said.

Guenee, Phalenites, vol. ii., p. 116, 1857, describes this species of Hubner, under the generic name *Sphecelodes*, crediting the species to Hubner, but ignoring his genus, as was Guenee's custom. He also describes the ♀, and pl. 22, f. 9, gives a figure of it. It differs very much from the ♂, having ciliated antennæ, and lacking the triangular flesh-colored costal spot. He is as much in doubt as was Hubner, as to its classification, but places it among his Fidonidæ. Walker, Cab. Brit. Mus. Geometridæ, p. 213, 1860, catalogues *vulneraria* under *Brotis* Hubn., placing *Sphecelodes* Guen. as a synonym of the genus. He also is in doubt as to the proper location of the genus, but places it at the end of the Ennominae, and says it does not seem to fit well anywhere. Guenee's

five specimens were from Brazil. Walker's five specimens were from St. Domingo. Neither seemed to have any doubt that the insect was a Geometer, though a somewhat anomalous one.

In the CANADIAN ENTOMOLOGIST, viii., 154, 1876, Mr. Grote tells us: "A drawing which I recognize as of this species (*Brotis vulneraria* Hub.) has been shown me by Prof. Hinsdale, of Racine, Wis., where the original was taken. I would not refer it to the Geometrae, but to the Noctuae (Fasciatae)." In the CANADIAN ENTOMOLOGIST, xii., 116, 1880, under the heading "North American Noctuidae in the Zutraege," Mr. Grote, after mentioning its capture as above stated, says: "Hubner considers it to be a Geometer, but I think incorrectly." But neither in these places, nor elsewhere that I can find, does Mr. Grote give any hint as to his reasons for his determination of the place of the insect.

In Papilio, iv., 72, 1884, Rev. W. J. Holland describes as new, *Sphecelodes floridensis*, from Indian River, Florida. I have one of his type specimens, but am not able to separate it specifically from *vulneraria* Hubn.

From the above it seems the species ranges from the Lakes to Buenos Ayres. It is probably common through the Tropics, and may be common in Southern Florida.

So far as its classification is concerned, it seems to me to be beyond doubt a Geometer. Antennae, head, venation and legs are all geometriform.

ENTOMOLOGICAL NOTES, SPRING, 1886.

BY A. W. HANHAM, HAMILTON, ONT.

Owing to the unusual and continued warmth of the weather during the two weeks ending April 28th, insect life has been very abundant, considering the time of year, and the few opportunities I have so far enjoyed of looking up their haunts have amply repaid me.

April 17.—Under boards and pieces of wood along fences were to be seen hundreds of *Drasterius dorsalis* Say. In company with this *elater*, besides many, to me, common beetles, I secured for the first time several *Languria Mozardi* Latr., a very showy beetle—the male looks very small by the side of the female. In the same afternoon I found a fine specimen

of the goldsmith beetle, *Cotalpa lanigera* Linn. Is not this an early appearance?

April 18.—Observed Hymenoptera and Diptera in large numbers and variety on and about a row of young sugar-maples, the bark of which had been punctured. Some hibernated Lepidoptera could have been easily secured by hand had I felt so inclined, so engrossed were they in imbibing the sweet sap. There were, however, too many Vespidae about for me to care to do much investigating.

April 23.—I found *Erycus puncticollis* Lec. very plentiful under logs and dèbris generally, along the edge of the marsh near Dundas. These weevils were all paired. Among some others taken the most conspicuous was *Sphenophorus pertinax* Oliv. Many Elateridae were taken from under the bark of stumps and fallen logs. They included several *Adeloceras*. I was fortunate enough to find a pair of *Cychrus Lecontei* Dej. copulating under a piece of wood. Also *Brachylobus lithophilus* Say. Other Carabidae were numerous, especially near the water. A better locality could hardly be found for the last named family. *Bothrideres geminatus* Say, and *Chrysomela clivicollis* Kirby were among my captures this day.

April 26.—Took *Dicaelus elongatus* Dej., a few Silphidae, and from under the bark of decaying stumps lots of small beetles, mostly Scolytidae.

April 27.—Two fresh specimens of *Staphylinus maculosus* Grav. from under stones.

May 1.—Discovered a good hunting ground a few miles from town, near the lake, namely, a few acres of thinly wooded forest land, on which were the stumps of many freshly-cut hardwood trees. On these, and especially under the chippings surrounding them, Coleoptera were very abundant, the most common being *Hylobius stupidus* Boh., *Clerus dubius* Fab., and several species of Nitidulidae (Ips). I captured one specimen of *Grynocharis 4-lineata* Mels., and a pair of *Cytilus trivittatus* Mels. On several of the stumps in sheltered nooks I came across patches of that beautiful lady-bird, *Megilla maculata* De Geer. Some of the larger patches must have contained quite fifty beetles. They were mostly of a lovely bright pink color; a few, however, had a brown or reddish tinge. About this date I took, in quantities, *Byturus grisescens* Lec.? off wild raspberry canes, evidently feeding on the opening buds. A little later in the year they are common upon the blossoms of the wild plum and cherry.

I must have taken or observed over thirty species of Carabidae during

my rambles on the days mentioned, some of them rather scarce ; also the followimg Cicindelidae : *C. Lecontei* Hald., *C. sexguttata* Fab., *C. purpurea* Oliv., *C. vulgaris* Say, and *C. repanda* Dej., the first named being the only rare or local kind. In walking over some sand hills or tracts on April 23rd they arose from about my feet almost in clouds. I do not remember to have met with them so abundantly before except late in the summer.

Cut-worms of many sizes and markings appear to be common this spring under boards, stones, etc. One morning about the beginning of May I noticed a sand wasp (Pompilidae Leach.) dragging a cut-worm, apparently nearly full grown, to its nest in the sand. When first seen by me the wasp was a foot or more away from home. The larva was not only much larger but heavier than its capturer, and much too weighty to be carried. The wasp found it quite an undertaking, for it left its prey several times, going to the nest, only to return for another pull. It is not unlikely that the distance covered previous to my arrival was considerably more than that while I was present.

I intend in the course of a few weeks to trespass further on the kindness of readers of the ENTOMOLOGIST by the insertion of continued notes.

ON WILLOW AS FOOD-PLANT OF P. TURNUS.

BY W. H. EDWARDS, COALBURGH, W. VA.

In Nov. No., 1885, I asked if readers of this magazine had ever found the larva of *Turnus* feeding on willow, etc., to which I have had several replies.

Mr. W. Brodie, Toronto, Can., wrote that on Sept. 10, 1885, Thos. Parks, of Toronto, found three larvæ in his garden under a peach tree, and he put them in a box and fed on peach leaves for several days, and till pupation. So far as I know, the peach has not before been observed to be a plant of *Turnus*.

J. D. Sherman, jr., Peekskill, N. Y., writes that his father, who once had a very large collection of American butterflies, " states positively that he has several times taken the larva of *Turnus* from the wild willow."

Miss Caroline G. Soule, of Boston, Mass., writes : " I have found more larvæ of *Turnus* on willow than on any other plant. I have found it on ash and poplar, but if I hunt for it, I take willow as the plant most likely to supply my need. This is in Stowe, Vermont, where most of my

entomological work is done. So marked was the preference for willow, that I find written on the margin of my Insects Injurious to Vegetation, 'chiefly willow, sometimes poplar.' I have always raised my *Turnus* larvæ on willow." And Miss Soule quotes from a letter from Miss I. M. Eliot, of New York, "with whom my summer work is done," and to whom she had mentioned the subject: "I wish Mr. Edwards could have seen the willow where we first found *Turnus!*"

Also, Wm. Bentenmüller, of New York, writes: "I have frequently found the larva of *Turnus* feeding on willow."

It is therefore settled beyond all question that willow is one of the food plants, though I do not learn that it is known to many collectors. Mr. Scudder quoted willow in his "Butterflies," but from a statement made by Mr. Gosse in 1845. And as I have before said, my larvæ at Coalburgh died before they would eat willow, and the plant was offered them repeatedly. As the same thing happened with me when I gave spice wood and sassafras to larvæ of *P. Ajax*, though in Tenn. Mr. Aaron says these larvæ certainly will eat both these plants, I conclude that larval habits as to food may differ decidedly in different localities.

ANNUAL REPORT, 1885.

Owing to unforseen circumstances, the distribution of the Annual Government Raport for 1885 has been unavoidably delayed. We are glad to state, however, that they have at last been received and forwarded to those members entitled to receive them.

ANNUAL MEETING.

The Annual Meeting of the Entomological Society of Ontario will be held in the Society's Rooms, London, Ontario, on Wednesday, October 20, 1886, at 7.30 p.m. Members are invited to prepare papers to be read, and to send them to the Sec.-Treas., Mr. E. B. Reed, if they are unable to attend.

CORRESPONDENCE.

Dear Sir: I notice in my article two serious errors that I overlooked in the proof, one clerical and the other typographical: Page 112, 11th line from bottom, read *dorsal* instead of ventral; page 115, 13th line from top, read *beak* instead of back.

JOHN HAMILTON, Allegheny, Pa.

The Canadian Entomologist.

VOL. XVIII. LONDON, AUGUST, 1886. No. 8

ON THE HISTORY AND THE PREPARATORY STAGES OF FENESICA TARQUINIUS, Fabr.

BY W. H. EDWARDS, COALBURGH, W. VA.

Nothing has been known of the history or earlier stages of this butterfly till quite recently, except what Boisduval and LeConte (1833) gave, both plate and text having been copied from Abbot (about 1800). On the plate the mature larva is represented as lying on a leaf of Hawthorn, and the chrysalis is attached to a stem of same. The larva is green and white-striped, and neither in coloration nor shape resembles the real larva, and the description in the text is made up from the figure. The chrysalis is a little better. The larva (according to Abbot) "lives upon Cratægus, and the species is very scarce." We also read that "this butterfly is plainly quite unlike the true Polyommati in its caterpillar and the shape of its chrysalis. Godart, who knew this species only by the description of Fabricius, wrongly believed that it was an Erycina." Boisduval puts it in Polyommatus with *Phleas*.

The late Professor Glover figured the mature larva and the chrysalis on plate xxii of his Lepidoptera, but the larva is surprisingly ill-done, being studded with round knobs that have no place in nature. The chrysalis is fairly done, and both dorsal and side views are given. On another plate is copied Boisduval's figures with no alteration (B., fig. 5). Mr. Glover told me that the larva fed on Hawthorn, and I believe that plant alone is written in his original work.

Many authors have spoken of the butterfly, and according to Prof. Riley, Mr. Scudder has given quite a list of food plants in different papers, as Alnus, Ribesia, Vaccinium, Viburnum, and conjecturally, Arrow-wood, Elder, Hawthorn.

At a meeting of the Ent. Soc. of Washington, 6th Jan., 1886, "a letter was read from Mr. C. L. Johnson, stating that he had observed a lepidopterous larva feeding on a species of Aphid, and had bred the insect to maturity. Mr. Lugger stated that the larva was that of *F. Tarquinius*,

and that he had also made the same observation several years in succession; though he had never actually seen them feeding on the Aphids, they were always found among them." At a subsequent meeting, Feb. 11, 1886, "Mr. Howard read a note from Prof. Riley in relation to the food habits of *F. Tarquinius*, in which it was stated that he had had for some time in his notes the records of observations by Mr. Pergande, who had found the larvæ actually feeding on the following species of Aphididae: Pemphigus Fraxinifolii, Schizoneura tessellata, and Pemphigus imbricator. The last named species is the one referred to by Messrs. Johnson and Lugger, at the last meeting." Ent. Amer., vol. 2.

Prof. Riley gave an abstract of the accounts by different authors of *Tarquinius*, in "Science," Vol. 7, No. 169, April 30, 1886, and of what was known as to its food, and stated four reasons why it was "more than probable" that different species of plant-lice "are the normal food of this larva." The essential reasons are the first and fourth. That attempts to feed the larvae on leaves had proved futile. That both Mr. Lugger and Mr. Johnson had found the larvae, but never dissociated from the plant-lice. But, concludes this paper, "neither of these observers were able to get positive proof of the fact." That is, I suppose, "proof of the fact" that aphides were the sole food, because all the gentlemen named had seen the larvae eating aphides.

That is all, so far as I know, which has been published on this matter to the present date. I am pleased to be able to say now that the full history of *Tarquinius* from egg to chrysalis has been followed out the past season, by Miss Emily L. Morton, of New Windsor, Orange Co., New York, well known as an enthusiastic lepidopterist. It has cost much patient labor, the observations having to be made mostly at a distance from home, in difficult ground, and running through several weeks. But the object has been attained, and I think little can remain to be discovered about the habits of *Tarquinius*.

Miss Morton kindly wrote me her notes from day to day, and sent eggs and larvae repeatedly, as well as supplies of aphides. Also sent the same to Mrs. Peart, at Philadelphia, so that drawings could be made at every stage. I propose to publish these drawings soon in But. N. A., Vol. 3.

Miss Morton wrote 11th Aug., 1886: "I saw a *Tarquinius* laying an egg on the twig enclosed (alder). She flew about and finally settled on the branch, depositing the egg right in the middle of the aphides. From

the care with which she settled in the midst of these creatures, I thought the larvae might possibly live on them. So I cut off the twig and send it to you. This female is in a bag in the woods where I found her." (I should say here that Miss Morton knew nothing of observations on *Tarquinius* by other persons. It was all new ground to her.)

On 13th Aug.: "The female laid but a few eggs, and those on the side of the bag, but I saw two more butterflies this morning, and both acted just as did the first one, carefully selecting a place in the midst of the plant-lice, in spite of a large black and red ant, which in great numbers was guarding the aphides. I watched closely, though I had to stand in the brook, and after some time I saw them lay 3 or 4 eggs, all among the aphides. I then cut off the limbs and brought them home, first bagging the females on the spot. After brushing off the lice, I found a dozen eggs, all on under side of the twigs. There were a few queer looking other eggs *on the leaves*" (perhaps of the grubs afterwards spoken of,) "also one small hairy larva, which I do not think can be *Tarquinius*, but as it possibly may be, I send it."

Leaving the letters for a little while, I will give my observations on the eggs and larva spoken of. One egg had not hatched, two or three had, and the shells remained, each with a hole eaten out of the top. They did not look to me like Lycaenid eggs, and I thought there must be some mistake about it, and that they were of some moth, or possibly Hemipterous. They were button-shaped, flat at base, lying nearly full breadth on the bark and firmly set, not quite circular; the curve at top like that of Lemonias *Nais*, not like Lyc. *Pseudargiolus*, the central depression broad and shallow, the surface somewhat rough, with no appearance under a Coddington lens of network; color pale yellow. Now all Lycaenid eggs known to me are covered with an elaborate and conspicuous lace-work, or are much sculptured. And the little larvae did not look like Lycaenid larvae. Rather like Tortrices, and their movements suggested that. The same thing struck Miss Morton. They were slender, of even thickness, each segment rounded, the body itself rounded, the feet, legs and head not in the least retractile; the hairs long and short, disposed very much as in some of the Nymphalidae, say Grapta or Phyciodes, the head as broad as body, and obovoid, but prolonged at the mandibles; on segment 2 a chitinous bar; color whitish-green.

I wrote Miss Morton forthwith that I could see no probable *Tarquin* eggs or larvae. However, I went in search of aphides, first visiting a

Hawthorn bush which I had set in my garden years ago expressly that I might some day have food for larva of *Tarquin*, and on which there had been myriads of aphides a few weeks before. But I now found none. The elms were visited with same result. At last I found a few on weeping willow, and put them in a glass tube with the larvae. I watched some time, but there was no haste on part of the larvae. I saw one of them go to an aphis, nose at it, push it and bite at it, lifting it partly off the leaf (the aphis being the larger of the two) and shaking it as a dog would shake a rat. But the victim escaped and retreated to the reverse side of the leaf, and the larva rested. Next morning, not an aphis was to be found. I got another small supply of willow aphides and presently saw a larva bite an aphis near the head and eat into the body so that its own head was buried, the aphis not resisting, nor even removing its sucker from the leaf. After a moment the larva let go and went its way.

Not finding more aphides on willow, I searched many trees and shrubs in vain, but at last found a young wild plum somewhat infested with them, and thereafter had a moderate supply. But there soon began to arrive boxes of twigs of alder covered with large woolly aphides, and eggs and larvae in all stages, sent by Miss Morton. The young larva (and the habit continues through the two earlier stages) pushes its way under the large aphides, or in case of such as are found on plum and willow, among them, and forthwith begins to spin for itself a loose web, not close enough to conceal it from view were the aphides away, but sufficient to keep the aphides from walking over the body, and to protect it when the moult is approaching and the skin sensitive. The web seems to be just about the length of the larval hairs from the body. The aphides may be seen running over it, and often get their legs fast in the meshes, and are very apt to be devoured as a consequence. Receiving these other eggs and larvae, I had pretty soon become satisfied that these hairy larvae were of *Tarquin*. The first stage was about two days in duration.

At first moult, the body was not so round, but a little flattened, and a little broadest in middle, the dorsum not raised, the legs and feet not retractile; the head a little within 2, but not more than with a Papilio larva; body clothed with many long hairs disposed in six rows, two sub-dorsal, one on mid-side, one along base; the hairs not in tufts but in groups, which spring from low tuberculous swellings; the hairs from base falling down and fringing the body; on 2 a chitinous band and in front of it 3 or 4 rows of long hairs which fall over head.

Miss Morton wrote 18th: "I have often found on the alder a hairy red and gray larva which produces an Apatela, and I thought the small larva I first wrote you about might be that. But if you saw it and the others were all like it, of course it can't be that." On 19th: "This morning I found what I think is a full-grown larva. It was resting in a fork of the bush close to a large colony of the aphides, but while I was wondering how I should get it in my box, so high on the limb was it, the way was suddenly made plain by a large ant rushing at and biting it furiously, and the larva curled up and fell to the ground. I thought I had lost it, but it fell on a bare spot, and here it is in a tube for your investigation, together with two other smaller larvae found feeding on the aphides. These were in a very thin web directly under a mass of aphides, and both were in the act of eating, each with an unlucky aphis kicking on its back, the head of the larva buried in its body. I have two more now before me, and both are devouring from underneath as fast as they can the swarms of aphides collected around them. There was a curious creature walking up and down the aphides, pulling the wool off them and sticking it on its own back. I removed it, fearing it might injure the young *Tarquins*, such formidable jaws had he." *

On 21st: The ants do not let the larvæ alone, but bite at them furiously whenever they see them; but until nearly grown the larvae lie concealed under the aphides with a web covering them, and cannot be got at by the ants without disturbing their cows. I went to the swamp again to-day to watch these most interesting creatures, and under nearly every pile of aphides found either eggs or larvae. But the larvae are so covered with the wool of the aphides and their webs conceal them so effectually that it is most difficult to detect them even with a powerful glass. The day was cool and cloudy and I did not see a single butterfly, but found about a dozen eggs and small larvæ, besides two nearly as large as the one I send you. There were places on the limbs of the alder where evidently full-grown larvae had cleaned off the aphides. At one place, the ants, a very large species, with black head and abdomen, and red thorax, were in a state of great excitement, running and biting in every direction, and had probably just discovered and routed a full-grown larva, as a large brown spot with all the aphides cleared off showed itself on the limb."

* This creature was a larva of a Chrysopa or Lace-Fly. See Harris' Ins., plate 3, page 247, for habits.

On 26th: "I went to-day to another swamp where I found quite a number of aphides, all on the stems of alder, some so low down as to be under the grass. There was also one butterfly flying, but I could not catch it. I got, however, one egg, which I mail to Mrs. Peart. There is a small Syrphus fly grub which devours the aphides far faster than does *Tarquinius*. I took 6 from the twigs of aphides which I send you to-day. These grubs stick the wool from the aphides upon their own backs, and are often difficult to detect.*

"After second moult, I find the larvae crawling naked on the limb seeking for fresh supplies of food; then they again spin a web, which they leave after the aphides are consumed. I do not think they spin after third (the last) moult. They then go about very quickly. There are four species of ants guarding the aphides on the alder, and I find fewest *Tarquinius* larvae among those guarded by the black and red ones I before told you of, though the butterflies do not seem to fear them in the least. The female lays her eggs generally close to or among a bunch of aphides, but occasionally on the leaf, if it rests on the aphides. The latter do not feed upon leaves unless just at the junction of them. On putting in a fresh supply for the larvae they at once burrow under and devour the aphides from the under side, unless after third moult, when the larvae eat roads through, but still from the under side, their backs covered with wool from the unlucky aphides. I think the wool prevents eating from above, for I noticed the larvae eat the red aphides from cherry from the back, or wherever they seized them."

Aug. 30th: "Each stem has to be cleared of ants, some species of which not only bite sharply enough to draw blood, but also sting, and cut off with a knife, the slightest jar often knocking off the aphides and such larvae as are not in webs. Then there is what I take to be a Syrphus larva which has to be removed, as it devours twice as many aphides as do the *Tarquins*. These lie under the aphides, often in a web of the *Tarquins*, and are very difficult to find."

Sept. 3rd: "Last night I saw a *Tarquin* just out of egg and watched it for over an hour spinning a web close to and almost under a large Syrphus grub. So I do not suppose these grubs injure the *Tarquins*. It crawled under the mouth of the grub and over its back, without the least

* Syrphus-fly grubs. See Harris, p. 248.

notice being taken by the grub." In another letter a farther observation is made going to show that the relations of larva and grub are not unfriendly.

Sept. 4th : "Have you noticed the ape's face which the chrysalis shows, when looked at upside down?"

At the second moult, the body was higher, and was broader in middle, and was more the shape of maturity, the hairs more abundant; the feet and legs not retractile; the head more covered by next segment than before, but very little, and that only along forehead.

The growth of these larvae is remarkable for rapidity, scarcely more than two days between moults, and there are but three moults in all. Such haste to reach chrysalis is what might be expected when one considers the nature of the food, its precariousness, and the activity of the enemies the larva is constantly exposed to. There is no long interval preceding a moult when the larva lies helpless, and this is particularly so at the third moult, when the larva is fully exposed to view. I watched several most carefully when I anticipated the third moult, but never was able to see it, or to know precisely when it occurred. I could see that a moult must have taken place by the fresh and differently colored skin of body, and the enlarged head. Miss Morton at first experienced the same difficulty, and wrote 30th Aug. : "Thursday morning the larvae had devoured every aphis in the box, and I remembered seeing some red aphides on wild cherry near the house. These I put in until I could go to the swamp, a mile away. When I returned, 3 hours after, three of the five larvae had moulted, after eating nearly the whole of the two square inches of aphides, though there was no appearance of a moult when I went away. These three had changed from the whitish and gray to the mature orange (on dorsum) and pupated Sunday morning (i. e., 3 days after 3rd moult.)" But Sept. 21st : "Since writing on the moults, I have seen the three, and have now eight larvae in all stages from first to last." Mrs. Peart also detected the third moult, and sent me four tables of the length of the several stages of as many larvae.

At third moult, the larva is .44 inch long,and .14 inch broad in middle, the sides tapering about equally either way; the dorsum is flattened broadly, and is highest at 6; the under side flattened; the feet are not retractile and the pro-legs cannot properly be called so; the head is covered more than before. As the stage proceeds, the head is more and more concealed by the growth of segment 2, but there is no extensile neck as in Lyc.

Pseudargiolus or Thecla *Henrici*, both which species I have described in their early stages; the low swellings before spoken of form three rows on either side, and on these are the clusters of hairs as before, but more numerous; and the lower hairs make a fringe as before; the color of dorsal area is pale gray, the outer edges white, and the side is white, with a pale brown macular stripe running through it, and above this is an oblique brown bar on each segment, except at the extremities; on mid-dorsum a macular brown stripe, and on 7 to 11 four brown rounded spots, two in front, two on rear; the sub-dorsal swellings are red-orange, or Indian red, or pinkish; there is much variation in individuals in all the markings; and I suspect the species of aphis fed on may cause variations, as one larva raised by me wholly upon plum aphides was at all stages whiter than those on alder, and the darker markings pale. The chrysalis of this larva was also lighter than any I have seen.

The chrysalis is .31 to .39 inch long, .12 to .15 inch broad at mesonotum, .18 to .22 at abdomen; extreme height of abdomen .2; the ventral side flattened and rounded laterally; the head case is prominent on ventral side, and nearly shape of larval face; behind it, and projecting somewhat over it, is the second segment, broad and incurved; the front of both 2 and 3 are turned up a little, so as to increase the excavation of 2; mesonotum prominent and nose-like, but flattened, and with a decided carina; followed by a considerable dorsal depression, and a deeper one on side, in which is an oval eye spot, as if set in; next, the abdomen rises abruptly, overhanging the depression like a brow on face; the abdomen is very high for width of three segments, then diminishes rapidly, and on dorsum rounds down to 13, but the sides of 11, 12 are greatly compressed; 13 is rounded and widened at the edges, and lies flat on the object to which it is attached like the hoof of a horse; the under side shows a flat rim, and a rounded interior depression, on which last is a broad circle of minute points; under a high power these look like so many walking sticks, with their straight handles bent at an angle of about 40°; color of ventral side whitish, glossy, more or less dotted with dark brown; the second segment white; mesonotum whitish and black; the eye-spot spoken of glossy black; the abdomen brown, grading on the sides into yellowish; dark patches on sides of 6, 7, 11, 12; the whole upper surface indented and roughened, but has a glossy appearance.

In all, the monkey's face is a conspicuous feature, the overhanging

brow, the deep-set eyes, the flattened nose, the curled and open lips (the white second segment.)

The chrysalis is closely pressed to the object by the shape of its last segment, but is also held by a girdle which passes over dorsum between 4 and 5, and is free at the upper lids of the eye-spots.

On 22nd Sept., I found that one imago had come from chrysalis, and was dead and dry. I suppose the period in this case was about 10 days. The other chrysalids will hibernate.

From laying of egg to hatching 3 and 4 days; in one instance in which Miss Morton saw the egg laid, the larva came forth at 3 days, and had reached 3rd moult at 9 days, date of the letter. One egg sent me hatched 29th Aug., 1st moult 31st Aug., 2nd moult 3rd Sept., 3rd not observed; pupation 8 Sept. Allowing 3 days for egg period, that would make 13 days from laying of egg to chrysalis, a pace unequalled in my experience. In the case of Agraulis *Vanillæ*, C. Ent., 12, 125, from egg to pupation was 16 days, the shortest period I think recorded by me.

The larvae, at Coalburgh, have several times been without food for many hours, or two or three days, and pupation has taken place when they were dwarfed from starvation. They always had plum leaves in the tubes, but never eat of them. I asked Miss Morton about this, and the reply 21st Sept., says: "I can answer as positively as you could wish. I left in the swamp, where I saw the first butterfly, four eggs in a bag, on a limb with leaves and a small cluster of aphides. Being prevented from going again for several days, I found the larvae hatched and three of them gone; not a trace of them in the bag, which I emptied on a sheet. The fourth larva was still alive, but stunted and weak. Being put in with fresh aphides, it eat ravenously, and finally changed to a very small pupa. It certainly had not eaten of the leaves. Besides this, I have always had a few leaves in the tin box with larvae and aphides, but even when the latter are entirely gone, the *Tarquins* have never touched leaves except to make their chrysalids on them. I have found that the larvae prefer leaves for pupating on."

On 24th Sept., I received from Miss Morton three larvae in 2nd, 3rd, 4th stages, and experimented with them amongst aphides on willow and plum, all small and naked species. The ants on willow are of a small species, honey-colored, those on plum of same size, but black. I laid the smallest larva on willow leaf directly by a small cluster of aphides, at which few ants were engaged. The larva paid no heed to the aphides,

but walked past and back and forth and was on both sides of the leaf The ants were somewhat inquisitive but did not trouble the larva, nor were they disturbed by it. This went on for about 15 minutes, when I removed the larva.

I put the next sized larva (2nd moult) on same leaves, and the ants were agitated, ran about gesticulating, but paid more attention to their cows than to the larva. I put this larva on a plum leaf by a large colony of aphides, at which were a dozen of the black ants. The ants sprang at it, bit at it everywhere, especially trying to get a hold under the edge of the body, where the surface is naked, or at the joints of the segments, or at 2, which being bent over the head is more exposed than any other segment. One determined fellow seized on 2 and was hardly to be dislodged, was at last by violent jerking of the head, but wounded the larva so that blood flowed. When the attack was at the joints the larva squirmed so as to tighten the joints just there. These attacks were simultaneous and by at least six ants at a time. The larva crawled away and the assailants mostly dropped off. I though it best to come to the rescue, else I should lose the larva.

I then put the largest larva (3rd moult) amongst the same excited ants, and they attacked it in same manner, but seemed unable to make impression on it. The hairs protected the whole upper side more sufficiently. The larva crawled up and down and over the leaf, followed by some of the ants, who attempted to seize it at every vulnerable part. But no harm was done. I repeated the experiments the next day, and came to the conclusion that the willow ants were mild-tempered, and seemed unlikely to hurt a larva; but that the black ones were fierce and would attack wherever they saw their enemy.

Now it may be that the butterfly avoids the fiercer ants and the aphides they guard, and therefore that the larvae are not to be looked for on certain plants. There is room for farther observation on this point.

I had noticed that whenever one of these larvae was removed by forceps a thread held it to the object, and I watched when making the experiments related to see if the ants would force the larvæ to drop from the leaf. But they did not drop. I shook the largest larva out of the box till it let out a thread a length of four inches. Then held the box to see if the larva would climb the thread, which it did, in about 20 minutes. It twisted its body into a spiral and whirled about so fast that I could not bring the lens to bear, but I could see that jaws and feet were active.

Now, all young lepidopterous larvae spin threads, and in falling guard themselves by this means, but I certainly never saw or knew of this habit in an adult butterfly larva. Adult or middle-sized Lycaenid larvae double up and fall on least provocation, but use no cord. Here would seem to be a means of defence in a larva always liable to sudden attacks.

Miss Morton calls my attention to the fact that ants do not disturb the larvae of the Syrphus flies, which with either woolly larvae, or naked species, as on cherry, devour far more aphides than do the *Tarquins*. "One would suppose the ants would at least expostulate in some way at the wholesale destruction going on, but though I have watched until the aphides were nearly devoured, the ants did nothing but pet their cows." Perhaps the wise ants have learned to submit to the inevitable.

I watched these larvae at every stage to see in what degree the legs and feet were retractile, and they certainly are not at all in the earlier stages, that is, up to second moult. Nor in the remaining stages any more than is the case with a Papilio larva. Mrs. Peart, who from drawing figures of feet and legs of many species and genera of butterflies, is accustomed to notice such points, writes me: "Through all the stages they seem to be the same as in Papilio larvae, but the fleshy legs are very short." I found a mature larva of Lyc. *Pseudargiolus* and placed it on glass slide by side of a mature *Tarquin*, and the difference in the appearance of and the handling of the legs and feet, was decided. If at the last stage *Tarquin* may be held to have the pro-legs at all retractile, as that word is used in describing onisciform larvae, it is but imperfectly, and not after the manner of the Lycaenidæ.

I should have said before that on looking at a stem of alder, which may be completely covered by the aphides, there will appear inequalities on surface, little hillocks as it were; and on pulling these apart, small larvae of *Tarquinius* will probably be found, in their webs. None at all will be visible, unless they are nearly mature.

Miss Morton writes, 23rd Sept.: "*Tarquin* gets itself stuck over with the wool of the aphides, and the Chrysopa larva, running over the *Tarquins* as well as the aphides, pulls the wool off the former also. I have watched, but never saw one of these formidable creatures bite or annoy a *Tarquin*. When the *Tarquins* moult, they come out bright and clean, but by the time they crawl their own length, they are again stuck over with wool, and this is the case till pupation. They are naturally so exactly the

color of the aphides on alder that I should not suppose the wool would be necessary to their preservation."

Also: "I have never found a chrysalis. though I have looked for them whenever I have been in the swamps. My larvae generally seek a leaf, but I think it probable the wild ones crawl down the stems and pupate among sticks or grass." The larva of Lyc. *Pseudargiolus* when ready to pupate drops to the ground.

The observations settle these points: that the eggs are laid directly among the aphides, and in case of stem-aphides, on the bark; that the ants do not destroy the eggs (though usually ants destroy every egg they find); that the larvae from egg to past second moult conceal themselves under the aphides, and under spun webs of loose texture, through the meshes of which they devour their prey, and which webs also serve to protect them from injury, especially at moulting time; that the larger larvae, that is, from before third moult on, are in full view, but besides being coated with wool from the aphides, have ways of protecting themselves from enemies, as by falling off the stem, throwing out a thread, or by falling to the ground; that there is no period, at any moult, of much length when the larva is helpless, and apparently none at all at third moult, when it is most exposed; that there are but three moults, and the whole larval period is exceptionally short; that the larvae will eat many species of aphides (possibly any, unless deterred by certain species of ants), but prefer the large, woolly ones.

I have repeatedly had letters from different parts of the U. S. and Canada, asking if I knew on what the larva of *Tarquinius* fed, and in nearly all cases the writers stated that the butterfly had been taken on or near alders.

Prof. Riley, in the Science paper quoted, notes that this is the only butterfly known whose larva is carnivorous. But next to nothing is known of the early stages of tropical butterflies, especially in the great family of Erycinidae. Both there and among the Lycaenidae there may be species which have this same peculiarity.

Godart conjectured that *Tarquinius* should be classed with Erycina. His instinct was right; Fenesica belongs to the Erycinidae. The present classification of butterflies, based as it is solely upon one stage of the four, is imperfect and at best but temporary, and is sure to give way to a better as the early stages of species become known.

At Coalburgh there would appear to be at least three broods of the

imago of *Tarquinius*. I have taken it in several years, in April, from 17th to end of the month and 5th May. Again in June, from 14th to 4th July; on this latter date I took 24, in 1868, and saw large numbers more; and again last of July, in several years. And I have repeatedly bagged the females on hawthorn, led thereto by what Prof. Glover told me, but always have failed of getting eggs. I have taken these examples generally up the branches of the creeks, flying about the stones in the nearly dry beds thereof. I remember that on the occasion spoken of when I took so many, the butterflies persisted in visiting a large stone, and I caught most of my examples by a bottle, so tame were they. So far as I know there were no alders or hawthorn within a mile of the points where the butterflies have been abundant. There were plenty of beeches, but the probability is that many trees or shrubs on which there was a good supply of aphides would attract the females.

I know nothing about the broods of this species at the north. As we have seen, eggs and larvae were found at New Windsor from middle of August to last of September.

NOTE.—After the above lines had been sent to printer, on 4th Oct., I received three nearly mature larvæ of *Tarquinius* from Mr. Henry F. Schönborn, at Washington, D. C., on alder. No information was received respecting these larvæ.

ON THE PREVIOUS STAGES OF PTINIDÆ AND ALLIED GROUPS.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

A small round box of bamboo (8 by 6 inches) was bought nine years ago in Hong Kong, China, and brought home to Boston. It was placed on a little shelf on the wall, and used for Turkish tobacco. The box was lined inside with a perfectly closing box made of East Indian block-tin, about a millimetre thick. I examined the box January, 1885, and found it hollowed throughout like a sieve, and containing between the tin box and the bamboo cover a large number of dead and living beetles and two living larvæ. The tin box had four small round holes apparently cut through by the insects. The beetles represented two species, one, a little

larger, only two specimens, all the others belonging to the second species. I submitted the beetles to Dr. G. H. Horn, and received the following kind answer :

" The beetles are not specifically known to me. The *Lyctus* (the numerously represented species) is different from any we have. The other is a Bostrichid, and is allied to *Sinoxylon*. There is just enough to show that the last three joints of the antennæ form a loose club as in *Sinoxylon*."

Therefore as the beetles are not yet known living in the U. S., they must have been imported from China, and lived and propagated in the bamboo box. I remembered directly a similar fact represented in the biological collection here. In 1870 was presented by Mr. J. H. Hubbard from Detroit, Mich., a piece of Supple-tack, a vine of Jamaica, imported nine years ago. Only during the last two years was observed fine mealy dust dropping out of numerous small round holes. By splitting the stick many living beetles and larvæ of a species of *Lyctus* were discovered.

I tried to make out the Chinese species, but Harold's Catalogue has no species of *Lyctus* or *Sinoxylon* from China. Lewis's Catalogue of Japan has *Lyctus brunneus* Steph. By comparing the description and figure in Steph. Illust. iii., p. 117, pl. 18, f. 4 (Wollaston Ins. Mad. were not at hand), and Kiesenwetter, Insect. Deutschl., v., p. 17, I suppose that the Jamaica species may be *L. brunneus*. This insect is given as imported by trade into Germany, and has been raised by Mr. Fuss out of walking sticks made from the so-called Cuba vine.

I compared the Jamaica and the China specimens, and find the latter ones identical with the smaller specimens of the lot from Jamaica, as I was not able to find any difference. But some of the larger specimens from Jamaica have a decidedly stronger sculpture on the thorax. Being well aware of the difficulty of determining species of *Lyctus*, and not having to compare a specimen of *L. brunneus*, I may only draw the attention of American entomologists to this species. It would be surprising if a species so widely spread and imported into Germany to the Baltic shores, and living in the Antilles Islands, should not be found in the United States. Considering the species near *Sinoxylon*, I am not able to give a determination. The larvæ in the bamboo box belong very probably to *Lyctus*.

In my Bibliotheca, ii., p. 499, are related all cases of insects boring through metals, mostly lead. I do not know if block-tin is known as in-

jured by insects as in the bamboo box from China. I believe that the boring was done by the species allied to *Sinoxylon*, because only very few holes were made, and because a related species, *B. capucinus*, has bored lead.

As it is of general interest to know the history and the habits of the insects belonging to this obnoxious and dangerous group, I have tried to make out the species of which the previous stages have been described. Therefore I have given a catalogue of the 32 species represented to-day in the biological collection of the Museum in Cambridge.

Besides these, Harold's Catalogue mentions 28 species more, of which the previous stages are described; Rupertsberger mentions 29 species more, and Riley 2 from the U. S.

The species of Ptinidæ and allied forms represented in the earlier stages in the biological collection in the Museum, are in alcohol, and besides, dry inflated larvæ; also parts of wood or other things in which they have made borings. For want of time and space, a very large lot of later additions have not been classified and arranged. There may be among them more species from North America.

PTINIDÆ.

Hedobia imperialis L. Europe. Im., larv., nymph, and bark with the craddle.

Ptinus fur L. Europe. Im., larv.

rufipes F. Eur. Im., larv., wood bored.

Anobium tessellatum F. Eur. Im., larv.

pertinax L. Eur. Im, larv. *Betula alba* injured.

striatum Oliv. Eur. Im., larv., nymph., wood of *Aesculus Hippocastani* injured.

emarginatum Duft. Eur. Im., larv., nymph, wood of *Pinus picea* injured.

nigrinum Er. Eur. Im. larv., wood of *Pinus sylvestris* injured.

paniceum L. Eur. Im., larv., boring in candy; the same species from U. S., boring in the pith, larv.; also destroying insects—Mr. Austin.

Ernobius abietis F. Eur. Im., larv., boring in cones of *Pinus picea.*

mollis L. Eur. Im., larv.; the same from U. S., boring in pine sap-wood; boring in corks.

Ptilinus costatus Gyll. Eur. Im., larv., boring in *Salix alba.*

Lasioderma serricorne F. Eur. Im., larv., boring in *Cacuma longa* from East India.

Mesocoelopus niger Muell. Eur. Im., larv.

Dorcatoma chrysomelina Strm. Eur. Im., larv.

Dresdensis Hlst. Eur. Im., larv., and cells in *Polyparus frumentarius.*

Caenocara bovistæ Hoffg. Eur. Im., larv.

Anitys rubens Hoffm. Im., larv., boring in *Quercus pedunculata.*

BOSTRYCHIDÆ.

Apate (Bostr.) capucina L. Eur. Im., larv., and a larva type from Ratzeburg.

Dinapate Wrightii Horn. Cala. Im., larv., from Horn's types.

Xylopertha sinuata Fr. Eur. Im., larv., nymph, boring in *Quercus pedunculata.*

LYMEXYLONIDÆ.

Hylecoetus dermestoides L. Eur. Im., larv., nymph; borings in *Fagus sylvatica;* also types from Prof. Ratzeburg. Larva, borings in *Fagus sylvatica* and borings in oak, a fact not known before (c. f. Ratzb. Waldverderbniss, ii., p. 151), from Stolberg in Harz.

lugubris Say. U. S. Im., larv., nymph; borings in elm, from Trenton Falls, N. Y., by Mr. H. J. Hubbard, May 20, 1874.

CIOIDÆ.

Lyctus canaliculatus F. Eur. Im., larv., nymph; borings in *Quercus pedunculata.*

opaculus LeConte. Philadelphia. Im., larv., nymph; types sent by Dr. LeConte.

planicollis LeConte. California. Im., larv.; raised by Dr. Horn from borings in Mesquit wood, from San Diego, Cal, 1884.

striatus Say. U. S. Raised from hickory, the types of the borings figured in the Hub. 1879, presented by Dr. Horn.

brunneus Steph. ? Jamaica. Im., larv.; raised from borings in a vine.

sp., perhaps the same. China. Im., larv.; raised from the bamboo box from China.

Rhopalodontus perforatus Gyll. Eur. Im., larv., nymph. In *Polyporus frumentarius.*

Ennearthron affine Gyll. Eur. Im., larv.; in *Polyporus squamosns.*

Octotemnus sp. Detroit, Mich. Im., larv.; in old sponges, by Mr. H. J. Hubbard, Aug., 1874.

Of the 668 species given in Harold's Catalogue, the previous stages of 100 species are published. They belong to 34 genera of the 81 enumerated by Harold. Only of 28 genera of the 53 enumerated in Mr. Henshaw's Catalogue of the Insects of the U. S., the previous stages are known. Only of 13 species of the 176 mentioned by Mr. Henshaw have the previous stages been described.

THE NORTH AMERICAN GENERA OF ANTHRACINA.

BY D. W. COQUILLETT, LOS ANGELES, CAL.

The sub-family Anthracina differs from any other of the Bombylidæ, as well as from any other group of Diptera known to me, in that the second vein issues from the third at a point opposite or nearly opposite the small cross-vein, the distance being never greater than the length of that cross-vein; the course of the third vein at the place where the second vein issues from it, is perfectly straight, while in the other Diptera the third vein bends obliquely downward at the same angle that the second vein extends upward at its base.

The genus *Dipalta* O. S. must be united to *Anthrax* Scop. It was founded upon a species *(serpentina* O. S., West. Dipt., 237) which differs from a typical *Anthrax* only in having three submarginal cells in each wing instead of two, and also in that the second vein is strongly bent S-shaped before its tip. I have two undescribed species which agree in every particular with *D. serpentina* O. S., except the course of the second vein; in one of these species this vein is nearly as strongly bent S-shaped before its tip as in *serpentina*, but in the other species it is not more strongly curved than in an ordinary *Anthrax.* The number of submarginal cells in each wing—three in *Dipalta* and normally only two in *Anthrax*—will not serve to separate these two genera, since specimens occur in several different species of *Anthrax* in which there are three

submarginal cells in each wing, and occasionally there are three of these cells in one wing and only two in the other wing of the same specimen. Thus every gradation between these two genera occurs, making it necessary to unite them under the older name.

From *Exoprosopa* proper I have separated those species in which there are four submarginal cells in each wing, the third being divided into two cells of nearly an equal size. I have examined numerous specimens of this group from all parts of the world, and in every specimen of any given species the number of submarginal cells in each wing is very constant. For the genus which shall contain these species I propose the name *Velocia* (from *velox*, swift); the *Anthrax cerberus* Fabr. may be regarded as the type of this new genus.

My new genus, *Mancia* (from *mancus*, defective), although most closely related to *Anthrax*, is sufficiently distinct; its separation from *Anthrax* is the more desirable as the latter genus already contains a great many species.

The following table contains all the genera of the Anthracina known to occur in North America:

1—Pulvilli pad-like, distinct; wings usually with only two submarginal cells 2

Pulvilli spine-like or wanting 3

2—Tip of antennæ bearing a pencil of hairs ..... *Argyramoeba*

Tip of antennæ destitute of a pencil of hairs ..... *Hemipenthes*

3—Style at tip of third antennal joint at least one-fourth as long as that joint; wings with three or four submarginal cells 4

Style at tip of third antennal joint minute or wanting; wings usually with only two submarginal cells 5

4—Wings with only three submarginal cells ..... *Exoprosopa*

Wings with four submarginal cells, the third being divided by a cross-vein into two cells of nearly an equal size ..... *Velocia*

5—Axillary cell not longer than twice the distance between tips of last two veins; third basal cell widest at its apex ..... *Mancia*

Axillary cell much longer than twice the distance between tips of last two veins; third basal cell not widest at its apex ..... *Anthrax*

Genus MANCIA, n. gen.

Same as *Anthrax* except that the axillary cell is not longer than twice the distance between the tips of the last two veins, and the third basal cell is wider at its apex than at any other part. Wings tapering considerably toward the bases, axillary cell very narrow. (Name from *mancus*, defective).

Mancia nana n. sp.—Front black, reddish tomentose and black pilose; face yellowish, much produced below, middle part white, the sides reddish tomentose; antennæ black, first joint sometimes yellowish, base of third joint subglobular, the styliform portion slender and linear; proboscis projects from one fourth to one half its length beyond the hyperstoma. Occiput reddish tomentose. Thorax black, mixed white and reddish tomentose; pleura reddish tomentose. Scutellum black, reddish tomentose. Abdomen black, reddish tomentose, a cross-band of white tomentum on the second segment. Venter black, white tomentose. Legs reddish, yellowish tomentose; front tibiæ sometimes provided with bristles; tarsi black, claws of front tarsi well developed. Wings hyaline, a brown cloud in middle of first basal cell, faint brown clouds on veins at bases of first submarginal, first and fourth posterior cells, and of the discal cell. Length 3½–4½ m. m. Cal.; 20 specimens, in April.

ON CECIDOMYIA LIRIODENDRI.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The two galls of the Tulip tree described by Osten Sacken, Monogr., Vol. I., p. 202, No. 26, *C. liriodendri* n. sp., and No. 27, *C. tulipifera* n sp., were wanting in the collection of his types presented by the Baron to the collection of the Museum in Cambridge. I am glad to state that I collected one of them in considerable numbers on leaves from a young Tulip tree on Quincy Street, Cambridge, in October, 1885. But all those galls were burst open along a part of the margin, and were empty. Prof. G. W. Farlow presented some collected in Newton, Mass., Oct. 12, 1886, and I found the living, full grown larva in one gall. I remembered then the tree in Cambridge, and found the same galls numerous, but again all empty. Apparently the larva has to be collected in the beginning of

October, or somewhat earlier. It is possible that the brown or reddish halo around the galls appears only later, after the larva has left the gall; at least the only gall containing a larva had no halo. The larva and its breast-bone agree with the Baron's description. But I was very much interested to find in the body of the larva two large eggs, with an embryo similar to those described for Miastor. We may conclude therefore that *C. liriodendri* also can be propagated by the larva. Perhaps the very numerous galls found often on the same leaf, of different sizes, may be the results of this kind of propagation.

In comparing the galls in the collection, I found very similar ones on *Fraxinus americana* (*C. pellex* O. S.), on *Quercus tinctoria* (*C. symmetrica* O. S.), on *Carya* (*C. caryæ-lamina* Walsh, and *C. glutinosa* O. S.), and on *Tilia americana* (*C. verruricola* O. S., CAN. ENT., 1875, p. 201). Osten Sacken, l. c. p. 202, speaks of similar spots on the leaves of the Tulip-tree produced by a Lepidopterous larva. I presume they are made by Nepticula or by Phylocnistis.

Of the 32 species of Cecidomyia galls described in Monograph, Vol. I., p. 190–205, besides the two from the Tulip-tree, 4 are not in his collection, *C. cynipsea* from hickory, *C. erubescens* from oak, *C. impatientis* from *Impatiens fulva*, and *C. agrostis* from Agrostis.

CORRESPONDENCE.

A CORRECTION.

Dear Sir: I wish to correct the statement made by me on p. 13 of the present volume of this journal, in regard to a pupa of *Elaphidion parallelum* Newm. being found inclosed in a silken cocoon. The cocoon in question was undoubtedly that of a parasite.

C. H. T. TOWNSEND, Constantine, Mich.

Dear Sir: In the article on explosive emissions from Carabidae, June No. CAN. ENT., I notice that the genus *Harpalus* is not included. While collecting in Conn. about a year ago, I took *H. caliginosus* in large numbers on the flowers of the rag-weed. Several filled my cyanide bottle with a dense white smoke. I noticed no explosions outside of the bottle.

GEO. F. CURTISS, Lynn, Mass.

The Canadian Entomologist.

VOL. XVIII. LONDON, SEPTEMBER, 1886. No. 9

CATOCALA NOTES.

BY G. H. FRENCH, CARBONDALE, ILL.

C. SAPPHO, Strecker.—Last season five specimens of this rare species were taken near here, and it was found about ten miles further north than before. It is as constant in its markings as any species.

C. RETECTA, Grote.—Both the pale and the dark forms of this species were taken last year, with intergrades. I should probably have taken them this season, but I was away from home at the time they were flying. In the woods the habits of the two forms are alike.

C. FLEBILIS, Grote.—This species is pretty constant here, the ground color being rather dark bluish gray, with the blackish longitudinal shade. A specimen in my cabinet from Pennsylvania that I received for *Flebilis* seems to be a stunted form of *Desperata*.

C. TRISTIS, Edw.—This beautiful little species has been found near here for three seasons.

C. RELICTA, Walk.—Through the kindness of Mr. James Behrens my cabinet contains a specimen of this species taken at Portland, Oregon, one of two captured August 22, 1885. It does not differ materially from our eastern forms, being intermediate between vars. *Bianca* and *Phrynia*. This is the first record I have seen of it further west than Illinois and Wisconsin.

C. WALSHII, Edw.—From the material that I have seen, it would seem to me that this ought to be far enough removed from *Junctura* to be at least a variety. The ground color is pretty uniform, and is nearly the same as that of *Nebraskæ*.

C. ADOPTIVA, Grote, *Delilah*, Strecker.—Has been taken near here twice, a single example each time; and *C. Consors* once.

C. PALAEOGAMA, Guen.—Singular freaks in insect life are illustrated in this species. Some seven years ago fifty of these could be taken in the woods in a single afternoon. Since that season scarcely one could be

found till last year, when they began to be numerous again, and are more abundant this year.

C. AMASIA, A.-S. Var. VIRENS, *n. var.*—This differs from the usual form in having more clear white for the ground color, very few brown scales in the median space below the median vein, the costal brown patch inside the t. a. line mixed with olive, a similar patch on the hind or inner margin, with traces only of brown and olive between. In the usual form this forms a continuous shade across the wing. The subterminal shade has only traces of brown in its anterior part, while the rest of the way the brown is pale. But the principal feature is an olive green shading that accompanies nearly all the black markings and forms shades below the forks of the median vein, and shades the terminal space. Described from one ♂, but it does not seem to be a sexual variation. I have males and females without these characters, as well as intergrades.

In the 16th Report of the Ontario Ent. Soc., Mr. Bowles quotes me as whipping trees and taking the Catocalæ that fly up in a net. They should be taken by placing the mouth of the poison bottle over them when they settle on the same or another tree. Taking in a net spoils them. While on this subject, I might add that I seldom capture females on trees in the afternoon, while half of those taken at sugar are likely to be females. Can any one say where the females are during the day time?

It is generally understood that Catocalæ are to be found on trees in the afternoons if the wind blows from the south or southwest. I find that during extreme dry weather the direction of the wind makes little or no difference.

ON THE GEOGRAPHICAL DISTRIBUTION OF NORTH AMERICAN LEPIDOPTERA.

BY AUG. R. GROTE, A. M.

In the preparation of the present paper I have used articles by myself which have appeared in the "Popular Science Monthly," in the pages of "Silliman's Journal," and elsewhere. I have also noticed what has been printed bearing on the subject by other writers. I have tried to present the whole subject as it now appears to me, at the risk of repeating myself in part. This seemed at times excusable if not unavoidable, but as it is

my own writings that I have chiefly borrowed from, the use of quotation marks is unnecessary, the more so as I have here gone freshly over the subject, digesting my previous observations and adding new ones before preparing the present chapter in a history of our North American Lepidoptera. Some of my views, as here stated, were put forth in a lecture I held in 1885, before the Bremen "Naturwissenschaftlichen Verein." I shall be glad if this paper adds to the interest naturally evoked by this field of study in Natural History.

It is a curious thought that our butterflies and moths have very probably remained unchanged, to any great extent, for real æons of time. These little fringes to the great web of animal life have withstood the tooth of time, while the pattern itself has been frayed out in places and replaced. It is not unlikely that our *Libythea Bachmanii** itself may have sported about the now long extinct Mastodon, alighting on the huge back of this great beast as it sunned itself by summer pools in the willow-hedged meadows and low lands. At the close of the Tertiary we have evidence that our butterflies and moths were much the same as they are to-day—not always the same species, nor the same genera, perhaps; and some of the kinds of these little fluffy ornaments may well have been worn away by the cold and storms of the slowly advancing Ice Period. But the pre-glacial ancestors of the present lepidopterous fauna of the Northern Hemisphere must have greatly resembled their descendants of to-day, while in the ranks of the larger animals great changes were to occur. While in size, structure and appearance these butterflies and moths of the Tertiary probably resembled those of the Quarternary, they were to undergo the vicissitudes of a general change in the climate under which we cannot believe but that they were forced to the South and the great separation of the faunas took place, their former Arctic sporting ground being converted into the frozen wilderness which it is yet so largely to-day. At the opening of the Quarternary the migration commenced to set back, but the conditions of climate under the Tertiary have never

* I chose this species not only on account of the fact that I believe it to be a very ancient form of butterfly, but because I found it very plentiful in Alabama about swampy places on the roadside, from whence the species flew up in numbers to play in the air, some settling on my horse in a particularly fearless manner, allowing me to catch one on the very reins I held in my hand. This species is rare and solitary in New York, and illustrates what I have to say here about the increase in *numbers* of certain species as we go southward.

again obtained and probably will never do so. The first conditions, then, for the presence of a species of Lepidoptera are those of warmth and food—a minimum of cold to be supported, a sufficiently extended time of warmth during which the insect can provide for its metamorphoses. The summers running too short, will prevent the existence of species, even where the food is abundant; while a few kinds of Arctic butterflies seem to take two years in which to perform their life changes, an acquired habit with the other phenomena of hibernation. In this respect there is a difference of hardiness between the species; it is probable that the *average* temperature is not of so much consequence as the point of its absolute lowness at given times, exposure to which, in certain of its states, the insect cannot survive. The same amount of cold might be innocuous to the egg, which would kill the chrysalis. That food itself is not sufficient for the presence of the species to which it is adapted, is a fact well known to collectors. While there are a good many accidental causes to account for this, in any one region, it is found also that the range of the plant is not necessarily co-extensive with the range of the species feeding upon it; here the climate (humidity, degree of cold) is one of the determinating causes. After warmth and food we must next consider enemies, parasites, competing species. This is a vast field for observation. The number of ichneumon flies is apparently influenced by special causes, so that in some years they do not destroy so many caterpillars; in shifting their ground the lepidopterous hosts sometimes evade their guests for a season. The birds destroy yearly a large percentage of these insects, but they, as well, are more or less plentiful from causes which are independent of the supply of insect food.

There is then to be considered the physical geography and the geology of the country. What are called by Entomologists "Chalk insects," are those species which inhabit by preference this formation, the geology of a district influencing its flora, and this in turn its insects. Forests are also protective to some considerable extent, less from depredators and enemies than from high winds, which tear our frail friends to pieces; and from sudden changes of temperature at an awkward moment, such as the change of dress from the caterpillar to the chrysalis state, or the previous and various steppings out of the larval skin, which, like getting out of one's trousers, is always a risky undertaking. The forest itself may seem to be bare of insects as compared with the open fields, where the broad bits of color of a butterfly's wings come into quick notice. But, in

reality, the edges of the woods are usually, and the interior quite often, where not too dark, the haunting place of these hamadryads where they escape notice for a time, while the moths, which I here especially discuss, are fond of these quieter dusky places in the daytime.

To understand the way in which our species of North American Moths are distributed (and by North American we mean those inhabiting the territory north of Mexico and the West Indies) we must then study the physical geography of the continent. There are a host of species which for the most part depend on special kinds of plants, and their diffusion is in this way limited by the range of the plants upon which their caterpillars subsist. The botany of a region is, to this extent, an index to its entomology. But, from their greater activity, these flying flowers, the Moths, range on occasion out of the way of the plants upon which they have fed in their young stages. If we take a map giving a bird's-eye view of the continent, with the elevations marked, we can understand the problem better. Ranges of mountains obstruct, valleys and river channels assist the dispersion of Moths. They travel on the wings of the wind, and an important factor in their range is the prevailing seasonal direction of the air-currents. There is, in North America, a summer migration of many species from the South to the North, aided by the prevailing winds, so that, towards the Fall, several tropical kinds have followed for long distances the coast line, or up the valley of the Mississippi. The Cotton-worm Moth, which, in its caterpillar state, inflicts great damages upon the plantations, is a case in point. If the direction of the prevailing winds in early summer from South to North were reversed, the Cotton Worm would not come up North. I have noticed that its advent along the coast was retarded by contrary or no strong winds. This seems to be the view held by planters along the coast of Georgia. Individual specimens or flocks of other moths, such as the Great Owlet, *N. Agrippina*, the Blue and Green Hawk, *Argens Labruscae*, visit us yearly, coming up from the West Indies, with other of the larger stronger-winged Sphingidæ and Noctuidæ. They die out in the winter and leave no progeny behind to continue the species the ensuing spring. But many kinds have effectually colonized themselves in South Florida, and there is probably an irregular line of successful hibernation for all these foreigners, including the Cotton-worm Moth, to be drawn through the Southern States. It is, then, clear that the provisions of Nature for the sustenance of these animals render a certain exertion necessary on the part of the Butterflies

and Moths themselves, to partake of them. This exertion it is which, in its results, assists in the formation of distinct species. To get their food, rest, protection, etc., a certain amount of work has to be done, and to do this work to the best advantage the functional systems are impressed. The food even of a caterpillar does not fall into its mouth. With all their apparent helplessness when discovered, it is only necessary to consider how difficult it is generally to find these helpless beings which exert themselves constantly to avoid observation from their enemies. Insects as well as man have probably much to learn, and are probably learning after their peculiar fashion every day. In particular I have been struck with the conscious way in which insects seem to provide for their escape from observation. They become rigid in their efforts to keep still. I do not think, however, that the "death mimicry" is a tenable theory. It is by the *keeping still* that the insects seem to me to appear to "feign death," of the existence of which latter they could have no knowledge. Hard-shelled beetles readily tumble to the ground, not caring for the fall, but soft-skinned caterpillars cling tenaciously. They seem to know that they cannot support the shock of a fall, the practical result of which accident I have often observed by finding dead Sphinx larvæ on the sidewalks after a storm which had blown them from their perches. Hairy caterpillars stick less closely than naked ones, relying on their bristles to act as buffers, and coiling themselves so as to shield the head, legs and under surface.

Rivers assist in the dispersion of insects, and in a less degree, perhaps the particular insects we are now discussing. Nevertheless, upon leaves and sticks the eggs of moths are floated on the current, while the commerce of the water routes and the great ocean itself brings eggs and pupæ with the vegetables and fruits which are carried from place to place in boats and ships. In this way the White Cabbage Butterfly has been introduced from Europe, and probably the Currant Borer, *Aegeria Tipuliformis*. A bird's-eye view of the continent of North America shows us the elevations of the Rocky Mountains and parallel spurs in the West and the Alleghanies in the East. These mountain ranges stand in the way of the spreading of Moths, which perish in the cold atmosphere and the storms which gather about their rocky summits. Our faunæ can be best appreciated by studying the elevation of the land above the level of the sea. Over the vast plains east of Colorado, the same kinds of Moths generally prevail. The canons and valleys of the West, on the other

hand, contain everywhere peculiar varieties and kinds often more local than in the East. In New York we are cut off again from several kinds plentiful in Ohio and Indiana. Our tropical wanderers come to us up and along the coast. I have met, sailing along the Gulf Stream, flights of moths, mostly of one and the same species, which fell on the rigging and sides of the vessel in numbers. In the autumn, on Staten Island, I have captured many Owlet Moths whose true home is the West Indies, such as *Perigea Epopea*, *Aletia Argillacea*, *Anomis Erosa*. The light houses on the coast attract many moths, and here specimens of *Euthisanotia Tinais*, the Spanish Moth, are not unfrequent in the late summer; this species breeds in South Florida, as discovered by my friend, Mr. Roland Thaxter.

Although smaller faunæ, limits of particular species, may be traced over the entire eastern portion of the continent, our mountain ranges are the best guide as to changes of a more general character in the Moths. When we get to the Rocky Mountain region we part with most of the Eastern species, though a few traverse the entire continent from East to West. As a whole the Californian and Western fauna resembles the European more than the Eastern. In the Butterflies this is seen in the more numerous kinds of Meadow Browns and the presence of a species of *Papilio* which greatly resembles the common European *P. Machaon*. In the Moths we have such genera as *Nemeophila* not found in the East; while, conversely, in the East we have Mexican, or South American forms, which do not seem to ascend the coast on the west side of the Rocky Mountains, such as the genus *Citheronia*. These and other facts lead me to a study of the origin of our various structural types of Moths, and the conclusion that we have three proximate sources for our fauna: 1. Descendants from a former Northern fauna, which in the Tertiary obtained in Northern Europe, Asia and America; 2. Immigrants and descendants of a migration from the South which is still going on; 3. Descendants of a former fauna, proper to North America itself and surviving the Glacial Epoch. An attempt to sort the genera of the family Sphingidæ under these three headings will be found in the pages of the American Journal of Science and Arts.

So true it is that one branch of a subject leads us to questions and matters quite foreign to the immediate enquiry, that here the subject of the geographical range of North American Moths leads us into myth and poetry. For, in finding out that we have species of moths closely related to or identical with some found on other quarters of the globe, the ques-

tion arises at once, How did they get here? They could not fly over from Europe, nor could they cross Behrings Straits with the cold climate there existing in recent times. We have historic evidence of the importation of but one or two species. We may surmise that others have at different times made their way across through commerce. I conjecture this may be the case with the Boll Worm and other species of the genus *Heliothis*. I think that the Cabbage *Plusia*, *P. Ni* of Hübner, is likewise an imported species. This latter insect is characterized by curious abdominal tuftings, which no other species of the genus shares; it is, in my opinion, its strongest specific character, and it is an absurdity to make a different species out of the American specimens (which have the same tufting as the European) on the strength of some infinitesimal differences, which, small as they are, are not even well made out to be constant. Much greater differences are exhibited by the American specimens of the Boll Worm; the race which I have called *umbrosus* being larger, paler, more greenish or olive tinted than the European, but other specimens occur also equally of a dirty ochrey, and undoubtedly equivalent to the European. It is the case also with the Cabbage Butterfly, that a sulphur colored variety, which has rarely been found in England, is not unfrequent in America, and for aught I know the form *umbrosus* may also occur in Europe, where, on the whole, this species of *Heliothis* is rare. The genus *Pyrrhia* resembles *Heliothis* in general structure, but differs decidedly generically by the tibiæ being unarmed, without spines or claws; the thorax is closely and thickly haired with a slight longitudinal crest; the face between the eyes is smooth, elevated. The wings are pointed at the tips, and the colors are peculiar, light yellow and dark orange red. We have in our fauna a species with rusty reddish yellow fore wings, crossed by darker lines, which is described by Walker as *Exprimens*, but is undoubtedly equivalent to the European *P. Marginata* Fabr. We have then a second form, not found in Europe, occurring in the Middle and Eastern States and Canada, *P. Angulata* Grote (=*P. exprimens* Speyer nec Walk.) Besides these two Eastern species we have a third, *P. stilla* Grote, found by Prof. Snow in Colorado, which has the fore wings of a bright orange red, smooth, evenly colored; the usual stigmata are wanting; the deep brown even median shade forms a band, acutely angulated on cell, strongly contrasting, diffuse outwardly; fringes with a bright red tint. The hind wings of this highly colored, lovely species, are light yellow, with a blackish lunule, blackish at base and with

a vague terminal blackish band tinged with red outwardly. Beneath yellow; the fringes on primaries red; red exterior bands and discal marks. This perfectly distinct species I have fully described in the pages of the North American Entomologist, 45. Here it is evident that a separation into several species has resulted from the isolation of the American original stock, unless we consider the form *marginata* to have been imported by commerce, of which we have no historical data, but yet which may have well happened. Not only *H. Armiger*, but I now believe the other European species of *Heliothis*, viz., *Dipsacea* and its variety *Maritima*, with yellow secondaries, and *Scutosus*, also occur in America, where I have given them other names when first discovered, not having European specimens at hand to compare, and also under the impression, which was first, I think, disseminated among us by Agassiz, that the European and North American species were distinct as a whole, and that the forms which resembled each other were "representative species." There is then a class of *identical* species of moths which have been probably disseminated by commerce, such as the above species of *Plusia* and *Heliothis*, the Codling Moth, *Carpocapsa Pomonella*, the Clothes Moths, *Tinea* and *Tineola*. But there are other *identical* species which have evidently *not* been so distributed. An example of this class is *Scoliopteryx Libatrix*, the Drinker Moth, which is found very far north in Hudson's Bay Territory, and occurs on the Atlantic coast at least as far south as Virginia. We then find species which, if found side by side with the type in Europe, would hardly be considered distinct; but, since the American specimens show a slight character in all stages, they may be held correctly to have attained the rank of species. Such species as *Apatela occidentalis*, *Hadena finitima*, *Hyppa xylinoides*, *Mamestra atlantica*, among the Noctuidæ, *Deilephila Chamaenerii* among the Hawk Moths, *Clisioeampa Americana* among the Spinners, fall under this category. In fact, as I have shown, there is an ascending scale of differences increasing in obviousness and importance until we arrive at what appear to me to be perfectly distinct species. In a number of different papers, published in various scientific journals since 1873, I have adduced facts bearing on the identity and difference of our species with European forms, and illustrating the existence of this element in the North American fauna. The latest and most interesting discovery made by me is that of a species inhabiting Arizona and allied to the European *Mamestra Brassicæ* of Authors. This species and the European constitute, in my

opinion, a distinct genus from the presence of a claw on the front tibiæ; the species have hairy eyes and otherwise generally agree with the very numerous forms of the genus *Mamestra*. I have called the new genus *Copimamestra*, and described our Western species as *C. Occidenta*. So wide a geographical separation as that of these two species, which, in structure as well as markings, agree so closely, must have a deeper reason and in my opinion points conclusively to a former common habitat which has become disturbed by climatic and geologic change.

We shall have to leave Entomology and go back into past geologic epochs to explain the existence in our North American moth fauna of this large number of forms with varying European affinities. Imaginative persons have supposed the existence in former times of an Atlantic continent now submerged and which bridged the chasm of the waves. The myth of the Atlantis has been furbished anew and on an immense scale by certain writers under the inducement of the facts supplied by the discovery of a plateau at the bottom of the Atlantic Ocean by the soundings of H. M. S. Challenger, in its famous voyage of oceanic discovery around the world.*

It is sure that there was formerly a warm climate in the arctic zones during the Tertiary and preceding geological age. This was a certain measurable time ago, when the circumpolar regions had a warm average temperature, with no winter, and the probable identity of the fauna ex-

* I print here the following note received from the lamented Naturalist, R. von Willemoes-Suhm, after whom I named the now well known genus of eyeless Crustacea (found in the Atlantic at great depths by the Expedition) :—

"Challenger, Yeddo, May 7th, 1875.

"My Dear Prof. Grote,—

"There can be no doubt, I think, that Prof. Thompson will allow me to put aside specimens of *Willemoesia* when we come back to Europe. Just now they are all packed away and sent home, where the bottles remain unopened until we come back, which will be in about a year's time, and I shall then be very happy in sending you the desired Crustaceans. I am, with great respect, your obed't serv't,

"(Signed) R. von Willemoes-Suhm.

"To Prof. Aug. Radcliffe Grote, Buffalo, N. Y."

This was the second and last note that I received from this enterprising Naturalist, who died on board the Challenger shortly after, and before the ship left the Japanese waters. So we may hope to get safely back home from our journeys and never see it again!

tending from Scandinavia, across Siberia to Greenland. During this time we must imagine that no impediment existed to the migrations of animals, and, among them, insects, across what is now Behring's Straits. Were this narrow channel then existing, it could be easily crossed by the flight of almost any Moth, and of itself could make no effective barrier against a constant interchange of species.

It is probable that the Tertiary, as it witnessed the first appearance of Man, saw also his first wanderings in North America. He, too, came from Asia by way of the North and the Strait. Evolution had performed surprising work in the meanwhile with one branch of the human family, members of which sailing to the West and landing from Scandinavian or Spanish ships, met, upon American soil, the descendants of a migration from Asia to America in a former geological period, and to the East! At the close of this Tertiary period of the earth's history, cold and snow and ice set in; the long winter of the ages made its appearance in the shape of the Glacial Epoch. The circumpolar Moths, whose more humble fortunes we must be content here alone to follow, were forced gradually southward by the change in climate which gathered its frigid strength in the North. The European, Asiatic and American faunæ then became separated, the latter the most completely, and by barriers both of ice and ocean. The American species of Moths which formerly lived by the Arctic Ocean, were gradually forced downwards to the South, year by year, until they reached Mexico or the then elevated portions of the Southern States. When the ice sheet melted and slowly drained away through the valleys and water channels of a continent awakening for the first time to a Spring and released from a Winter of the Years, the Moths, modified as to species in the long conflict with the climate, retraced their way to the North. As marks of this retreat and return, colonies of Butterflies and Moths were left on the mountains to tell of the flood. On the White Mountains we find to-day the White Mountain Butterfly, *Oeneis Semidea*, and the Arctic Lappet Moth, *Laria Rossii*.* At this time the Western Clawed Cut-worm, *Copimamestra Occidenta*, had become permanently separated from what is now the European *C. Brassicae*, and the differences which separate the two to-day as distinct species are the result

* See a number of papers on this subject, in particular my original communication read before the American Association for the Advancement of Science, August, 1875, and an article entitled "A Colony of Butterflies," originally printed in the *American Naturalist*.

of the action of the total environment upon what was once the same undistinguishable form. The element in our Moths which has its affinity with the European and Siberian fauna, must be traced back to the time when the species were throughout the same and inhabited a common territory.

Let us turn back to the other theory, that of a submerged Atlantic Continent. Whatever may be finally proven by geology as to the existence of such an Atlantic bridge, it is clear that the myth of the *Atlantis*, cited to support the theory, must be separated from such facts as being of recent and even historic origin. Primitive Man existed æons before the notions which were worked into the poetic and semi-historical myth of the Hesperides and Atlantides. The setting sun was followed by human eyes for untold ages, as it bathed itself in the golden flush of evening and sank behind the purple veil of clouds into an ocean whose waters were at first believed to surround the circular, flat earth. The sun was the golden apple of the garden of the Hesperides, the Golden Fleece after which Jason sailed. The poets transformed the primitive notions into charming myths, which probably had their origin in the observation of low-lying clouds, floating, like islands, in a sun-flushed western sky. In this region of conjecture and romance it is excusable to take to rhyme:

ATLANTIS.

The western sky is all ablaze,
And, floating on that golden sea,
The clouds, like islands in a maze,
Blest dwelling-places seem to be.

When first this sight was viewed by man,
He thought the earth was flat, not round;
That all about its rim there ran
An ocean which the land did bound.

The poet in those early days
Immortalized the sun-flushed seas;
He peopled those far slopes and bays,
And called the isles Atlantides.

And so the legend grew until
The clouds in evening's dreamy light,
With which the poet showed his skill,
Had vanished from the mental sight;

Instead, the story true appeared
And every sailor did his best,
While straight from port the vessels steered
For those far islands in the west.

But none returned of all who went,
Who sight of those fair islands caught,
Through the white waves the tempest sent
The barks which shattered home were brought.

And some returned no more—but these
Were fabled to have reached the strand,
Where, anchored in luxurious ease,
Their ships will never leave the land;

The crews lie on those sunny slopes,
Purple with fruit, with vintage blest;
The ships are held by flowery ropes
In sleepy bays content to rest.

The poet steps into his boat,
The sunset makes his starting fair,
Through the long night with Death he'll float,
And in the morning he'll be there.

The study of the geographical distribution of our Moths has led us a long way back in the history of our race and the birth of our ideas. We have now somewhat briefly, but, I hope, clearly, discussed the basis for this first element in our Moth fauna, and I would merely point out that in studying the unequal differences which show themselves between the allied forms, I have found a certain system in the variational characters. These, when compared, are first obvious on the upper surface of the fore wings, then on the upper surface of secondaries, and finally beneath. In other words, this variation follows the exposure of the different surfaces to the air and light, the moths resting chiefly by daylight with the primaries more or less deflexed and their upper surfaces exposed, covering the hind wings. An instance in point is the White Underwing, *Catocala Relicta*, an insect which has a certain range of variation in the general color of the fore wings, which are sufficiently unlike those of its near European ally, the Blue Underwing, *Catocala Fraxini*. The upper surface of the hind wings is very much like that of the European species, except that the narrow median band is *white*, not dusky *blue*. But I have originally

shown,* and my statement has been copied by later Entomologists, that in some specimens of our species the band shows blue scales on the edges, evidently a trace of a former greater resemblance between the two, on the under surface yet very similar species.

The second element in our Moth fauna is that which is South American or intertropical in its character. In the Hawk Moths such genera as *Aellopos*, *Enyo*, *Cautethia*, *Philampelus*, must be reckoned as such, while in this category we must distinguish between those forms of recent and partial or more ancient and entire acclimatization in the United States and Canada. As coming under the latter head we may reckon the genera *Citheronia* and *Eacles* among our larger Moths which enjoy a much greater representation in species in Mexico and South America.

The final element of peculiarly North American genera is a large one and in every family of Moths has abundant representation. In the Hawk Moths *Arctonotus*, *Lepisesia*, *Deidamia*, *Everyx* and *Cressonia* are instances; both the Spinners and the Owlet Moths have numerous examples of this category.

(To be Continued.)

A NEW PHYTOPTOCERIDIUM FROM NORTH AMERICA, ON ACHILLEA.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

In the middle of September, 1886, Prof. W. G. Farlow sent to me several specimens of the heads of Achillea (probably *A. millefolium* L.) collected on Mt. Washington. They correspond well with the deformity described by Dr. Fr. Thomas in Giebel's Zeitschr., 1872, vol. 39, p. 464, on *A. moschata* Wulf. The flowers are to a large part changed in white hairy sacs or galls, containing a number of living Phytoptas. As far as

* In the CANADIAN ENTOMOLOGIST, vol. vii., p. 186; also *Ann. Lyc. Nat. Hist. N. Y.*, xi., p. 301, 1876, where I show that certain writers are at fault in considering the variation in the color of primaries in this prominent species as sexual, the whitest examples being given as the males; consult also an article in the CANADIAN ENTOMOLOGIST entitled: "On Species of Catocala," pp. 229–232.

known to me, this gall is not yet described from the U. S., and is very similar to those of *A. millefolium* described by Mr. Fr. Loew, Verhdl. Wien. Z. B. Ges., 1878, vol. 28, p. 130, which is to be found in Baron Thuemen Herbar. mycolog. oeconom. Suppl., I., No. 60. Our collection possesses a specimen by Prof. Thomas with the indication of *Tylenchus (Anguillula) millefolii* Loew. At first I believed to see also in Prof. Farlow's specimens, besides the Phytoptas, some *Anguillula*. But the polarised light showed directly that I had mistaken some fragments of the fine white hairs for *Anguillula;* the polarised light would have shown directly the muscular apparatus in the *Anguillula*. It is nevertheless probable that other plants of *Achillea* may contain the *Tylenchus*. I believe that the galls before me may have contained before a Cecidomyia, though the European species is not yet recorded from the U. S. As *Achillea millefolium* is common in the north of the U. S., I desire to draw the attention of Entomologists to this plant. The European literature on the parasites of *A. millefolium* is somewhat large.

ENTOMOLOGICAL CLUB, A. A. A. S.

The Club met at Buffalo, N. Y., on August 17, 1886, at the rooms of the Buffalo Society of Natural History, 14 members being present.

The session continued at intervals during the meeting of the A. A. A. S. The following persons were in attendance during the meeting: J. A. Lintner, Albany, N. Y.; J. H. Comstock, Ithaca, N. Y.; S. A. Forbes, Champaigne, Ill.; L. M. Underwood, Syracuse, N. Y.; T. B. Stowell, Courtland, Ill.; Rev. R. Benjamin, Cincinnati, O.; E. W. Claypole, Akron, O.; Dr. J. B. Tweedale, St. Thomas, Ont.; D. S. Kellicott, E. M. Chamot, O. Reinecke, C. D. Zimmerman, Ph. Fischer, E. P. Van Duzee, Buffalo.

The Entomological Society of Ontario was duly represented by Mr. Wm. Saunders, Rev. C. J. S. Bethune, Mr. J. Alston Moffat, and Mr. E. Baynes Reed.

The President, Prof. J. A. Lintner, took the chair, and Mr. E. B. Reed acted as Secretary in the absence of Mr. J. B. Smith, of Washington.

The President gave his annual address, which was a very able review of the progress of Entomology, as shown in publications which have appeared since the last meeting.

Prof. Lintner also alluded to the absence of some who were usually attendant at the Club meetings, referring especially to Prof. C. V. Riley, who was then in Europe for the benefit of his health.

Dr. D. S. Kellicott, on behalf of the Buffalo Society of Natural History, placed the rooms at the disposal of the members of the Club.

The President paid a high compliment to the contributions to Entomology that had emanated from the rooms where they were meeting.

Prof. Comstock explained a new method of arranging collections by which loss of time is avoided in transferring specimens so as to make room for additional species, or making necessary changes in their arrangement. The main feature of this plan consists in having movable blocks on which the insects are pinned, but made in sections to fit the cases.

The following officers were elected for the ensuing year :—

President -	Prof. J. H. Comstock -	Ithaca, N. Y.
Vice-do - -	Prof. S. A. Forbes - -	Champaigne, Ill.
Secretary -	Mr. E. Baynes Reed -	London, Ont.

The following is a summary of papers read before the meeting during the session :—

Prof. S. A. Forbes—Notes of the Past Year's Work: The Hessian Fly, *Cecidomyia destructor*, has been found to hibernate in Southern Illinois as a naked white grub, not forming puparium until May following, and emerging before harvest; these are probably the offspring of a midsummer brood, which develop in volunteer wheat. The Clover Seed Midge, *C. leguminicola*, was observed first in 1879 in Illinois. A new Chalcid parasite, *Tetrastichus*, has been reported, but its worst enemy so far observed was *Triphleps insidiosus*. The young of this species are often so abundant on the clover heads as to be mistaken for the injurious midge, but a little observation will show their beneficial character. The Wheat-stem Maggot, *Meromyza Americana*, is shown to have three broods instead of two only. Eggs and half-grown larvæ were found in abundance, August 4th. Two species of *Melanotus*, *communis* and *cribulosus*, were bred to maturity, and a third Elaterid not yet determined, of which figures and precise descriptions have been prepared. Larvæ of these, and of *Agriotes mancus*, and of a *Cardiophorus*, were reported as injurious to

Indian corn, the peculiar larvæ of the last boring the roots in all directions in sandy soil. *M. cribulosus* pupates in July and forms imago in September. The Corn-root Worm, *Diabrotica longicornis*, is reported as seriously affecting crops in Southern Illinois. The common pale Flea Beetle, *Systema blanda*, was bred from larvæ feeding on kernels of sprouting corn in the earth. *Epicærus imbricator* taken feeding on leaves of pear; eggs laid in single layer on leaves, concealed by the insect fastening together the opposed surfaces of the leaves. Larva of *Sphenophorus parvulus* found to infest the roots of meadow grass (timothy). The midge sucks the sap from stems of wheat and corn. The Corn-plant Louse, *Aphis maidis*, was very injurious; observation shows that they are strictly dependent on the ant, *Lasius alienus*, which mines along the principal roots, collects the plant lice and conveys them into these burrows and there watches over and protects them. The ants have nothing to do with the hibernation of the lice, their winter nests never containing them in any form, either in corn-fields or other situations; the facts indicate that the lice hibernate as wingless females on the earth of fields previously infested. The Currant Worm, *Nematus ventricosus*, was mentioned as a case of retarded development. Mr. Bethune had noticed a similar case in *Attacus promethea*. The Root Web-worm, *Crambus zeellus*, was very destructive to corn in Illinois. A detailed description was given of its earth nest and the method and character of injury done to corn by this species. It hibernates as a larva, pupates in a tubular nest in June, emerging June and July.

A paper was read from H. Garman: Contribution to Life History of *Aphis maidis*.

Paper read from W. L. Deveraux: A Dangerless Insecticide for Collecting Bottles. The best vegetable container of prussic acid is the bark of the wild cherry, *Prunus serotina*, to be used for the Serotina bottle for young collectors, like the Laurel bottle of European entomologists.

In the discussions that took place,

Prof. Forbes stated that the attacks of *myrmis* had considerably lessened the number of grasshoppers in Illinois.

The President called attention to the unusual number of Aphides in New York State. They had been found on apple, black currant, tomato, and on potato in the Eastern States. The hop crop was almost destroyed by them in New York.

Mr. Bethune had also found them very numerous on the north shore of Lake Ontario.

In reply to a question, Prof. Lintner stated that European entomologists had come to the conclusion that the Aphis of the wild cherry and of the hop were identical.

Mr. Fischer called attention to the probable identity of *Spilosoma fuliginosa* and *rubricosa*. He also exhibited a specimen of *Catocala obscura* just taken by him for the first time in Buffalo.

The President called attention to the fact of the earth worm being the host of a parasite, and therefore dangerous to fowls and poultry.

An excursion of members of the Club took place to Ebenezer, where a very pleasant afternoon was spent, and some interesting captures were made, among the most interesting being *Cicindela ancocisconensis*.

The Club adjourned to the call of the President at the next meeting of the Association.

THE HIGHEST ELEVATION FOR NEUROPTERA IN THE UNITED STATES.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Mr. H. W. Turner, U. S. Geol. Survey, San Francisco, Cal., has sent to me Phryganid cases from Mt. Conness, Mono Co., living in water at an altitude of over 10,500 feet. They are 15 m. m. long, the front half made by irregular small bits of stones, the apical half of short bits of pine leaves, and the case being narrower; around the case are placed longer parts of pine leaves or grasses in a herring-bone fashion. A few dry larvæ and the shape and arrangement of the cases show them to belong to the family of Limnophilidæ, and to the group of Hallisus.

Other cases were collected from a small lake on the north side of Mt. Dana, at an altitude of over 11,500 ft. These cases are smaller, 10 m. m. long, of little bits of mica and other stones, more cylindrical, sloping a little to the end. They seem to belong to the family of Sericostomidæ, which is at least not contradicted by some remnants of dry larvæ.

At the same place were collected a few sub-imagoes of Ephemerina, probably belonging to the group of Potamanthus; wings and body are blackish.

As far as I know, this is the highest elevation in the U. S. from which Phryganid larvae and Ephemerina are reported to live. From South America I have Phryganid cases out of Lake Titicaca.

CORRESPONDENCE.

Dear Sir: In the July No. of the CANADIAN ENTOMOLOGIST for this year, is a list of the North American Sphingidæ, by A. R. Grote, A. M., in which, amongst other valuable matter, there is a paragraph which reads thus: "We have in South Florida a West Indian colony, the extent of which is not yet known. Stragglers from the south, as *Ello*, *Titan*, *Labruscæ*, invade even New England. How far north these breed with us is not known. They seem hardly to belong to the North American fauna, but are all included here so far as they have been reported to me as being taken within the political limits of the United States." I have now to report that *Dilophonota Ello* Linn. has reached this locality, four specimens having been taken this fall, three by Mr. Johnston in the city, and one by Mr. Kyle in Dundas. Mr. Grote's remarks seem naturally to suggest the question, Did these specimens fly to us from a distance, or were they bred here? If they were bred in this locality, then the next thing in order will be information about its food plant. It seems to appear somewhat late in the season, one being taken on 1st of October.

In June last I took a beetle seldom seen in Canadian collections, *Anthophila viridis* Lec., which I identified by a specimen in the fine collection of Mr. Reinecke, of Buffalo, the attractive, sparkling golden-green of its elytra giving it far more the appearance of a South American species, than one to be got in the North. Some information about its habits would be very acceptable. I captured my specimen on the wing.

J. ALSTON MOFFAT.

A RARE MOTH.

On the 23rd of August last, I had the gratification of capturing a female *Erebus odora* at Niagara Falls, Ont. The specimen, which was fresh and perfect, evidently just emerged from the chrysalis, was resting on an awning close to an electric light, on the verandah of the Clifton House. It was about 11 p. m. when I made the capture; the evening was warm, and a gentle rain had been falling for some hours. Close to it I also obtained a beautiful specimen of *Catocala relicta*, a moth that I have rarely taken of late years.

C. J. S. BETHUNE, Port Hope.

A few days ago Professor Ropes, Andover, Mass., had the kindness to show me the library of the Theological Seminary. The books of the library, i. e., the back of the binding, as the Professor wrote to me some time ago, are injured to a very large extent by Lepisma. Most of the bindings were from Germany, covered with varnished paper, but some bindings were from England and from the U. S. Some loose sheets of printed paper are eaten on the margins and have many holes besides. The Professor believes that Turkish-Morocco bindings stand best against these pests.

H. A. HAGEN, Cambridge, Mass.

DATES OF PUBLICATION.

The numbers of this current volume xviii. of the CANADIAN ENTOMOLOGIST, were published at the following dates :—

January number,	March 6.	May number,	July 22.
February "	" 16.	June "	August 16.
March "	" 23.	July "	October 7.
April "	April 21.	August "	" 29.

The Canadian Entomologist.

VOL. XVIII. LONDON, OCTOBER, 1886. No. 10

EDITORIAL.

It will be with deep regret, we are sure, that the readers of THE CANADIAN ENTOMOLOGIST will receive the information that MR. SAUNDERS, who has for so many years so ably filled the position of Editor of this magazine, has felt himself obliged to resign for the present all active connection with it. His resignation has been occasioned by his appointment to the important and arduous office of Director of the Experimental Farm Stations of the Dominion.

For some time last year Mr. Saunders was engaged in visiting many of the Agricultural Colleges and Experimental Farms in the United States, and prepared an exhaustive report upon his observations, which was laid before the Dominion Parliament at its last session, and received the highest commendation. During the present year he visited England in charge of the Canadian fruit display at the Colonial and Indian Exhibition in London, and since his return he undertook and carried out successfully the experiment of shipping to England a large variety of fruits and vegetables in special refrigerators, constructed under his direction in two of the principal ocean steamships sailing from Montreal. These multiform occupations, involving almost constant absence from home, while they attest the versatility of Mr. Saunders' powers, will account to our readers for the occasional want of punctuality in the issues of this magazine during the last twelve-month.

With regard to his fitness for his new position, we may quote an extract from the Ottawa correspondence of the London *Free Press:*

"Mr. Saunders is a gentleman singularly well qualified for the position to which the Government has appointed him. He was for years President of the Ontario Fruit Growers' Association—a position which he held by reason of his superior knowledge of all that appertains to the cultivation of fruit. He is recognized as one of the leading chemists of the Dominion, and was at one time one of the chief officers of the American Association for the Advancement of Science. He has been for years the

leading entomologist of the Dominion, and to that branch of natural science has made many valuable literary contributions. He is a member of the Executive Board in charge of the Provincial Agricultural College at Guelph—a position which shows in some degree the extent to which his knowledge of scientific agriculture is recognized by the Ontario Government. He has, to an extent more generally perhaps than any other man in the Dominion, conducted delicate experiments of an agricultural character, and in assuming the directorship of the new farm stations will be following in the groove to which his efforts and education have for years tended. He also combines with rare executive ability the faculty of intelligently communicating his ideas to others. Just such a man was wanted."

Having enjoyed the privilege of Mr. Saunders' friendship for close upon five and twenty years, we feel that the above description does not express one half his merits. Taking him all round, we know of no one who possesses such an accurate knowledge of various departments of science, for instance, Entomology, Botany, practical Chemistry, etc.—of fruit culture, embracing the scientific work of hybridization—of finance,—in fact, in all that he takes up he speedily becomes *facile princeps;* and with it all he has a geniality of character and a kindness of heart that win for him hosts of affectionate friends wherever he goes. While we regret his loss to our Entomological Society—a temporary one, we trust—we cannot but congratulate the Dominion upon the possession of a man who is so well qualified in every way for the important work of organizing and directing its Experimental Farm Stations.

At the request of Mr. Saunders, as well as of other members of our Society, we have consented, with much hesitation, to endeavor to fill the vacant chair of Editor of THE CANADIAN ENTOMOLOGIST. We only venture to resume this work, after a lapse of thirteen years, in full reliance upon the kind consideration and the hearty co-operation of all our old friends—of all, indeed, who are interested in the welfare of this magazine, and in the extension of a knowledge of our special department of science. We have already received so many cheering letters and so many valuable and interesting contributions from leading entomologists in this country and the United States, that we feel very hopefully confident that the reputation and usefulness of our journal will be sustained in the future as in the past.

Not to trespass further upon the patience of our readers, we have now to request that all communications for THE CANADIAN ENTOMOLOGIST should be addressed to the Editor,

REV. C. J. S. BETHUNE,
Trinity College School, Port Hope, Ontario.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held pursuant to notice at the Society's rooms, London, Ontario, on Wednesday, October 20, 1886, at 8 o'clock.

The Vice-President, Rev. C. J. S. Bethune, M. A., of Port Hope, in the chair.

Present: Mr. James Fletcher, Ottawa; Mr. J. Alston Moffatt, Hamilton; Rev. Thos. W. Fyles, South Quebec; Mr. A. W. Hanham, Hamilton; Capt. Gamble Geddes, Toronto; Dr. J. R. White, Toronto; Mr. J. M. Denton, Mr. J. Bowman, Dr. Burgess, Dr. Arnott, Dr. Woolverton, Mr. H. P. Bock, Mr. Laurence Reed, Mr. Werner, Dr. Wishart, Dr. Mitchell, of London, and the Secretary-Treasurer, Mr. E. Baynes Reed.

The minutes of the previous meeting having been printed and circulated among the members, their reading was dispensed with, and they were duly confirmed.

The Secretary read a letter from the President, Professor Saunders, regretting his inability to be present at the meeting, and stating that he would be unable to continue in active participation in the work of the Society, or to act as Editor of THE CANADIAN ENTOMOLOGIST, inasmuch as he had accepted the Government appointment of Director of the Experimental Farm Stations, and consequently the whole of his time would necessarily be fully occupied.

The report of the Council, the audited financial statement of the Secretary-Treasurer, the report of the Librarian, the report of the Delegate to the Royal Society of Canada, and the report of the Delegates to the American Association for the Advancement of Science, were laid before the meeting, and on motion duly received, discussed and adopted.

These reports will appear as usual in the Society's Annual Report to the Ontario Government.

The report of the Montreal Branch was read by the Secretary, and was ordered to be printed in the Annual Report.

In the absence of the President, his annual address was read by the Secretary.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

GENTLEMEN,—

It is seldom that a season passes in Canada with so little to record in reference to the injuries caused by destructive insects. Not only have we been favored by a kind Providence with a bountiful harvest, but our farmers have been free in great measure from the losses which usually occur from insect pests.

The Colorado Potato Beetle, *Doryphora decem-lineata*, has proved destructive to potato vines in a few localities, and where the application of the usual remedies has been neglected or too long delayed, they have destroyed the foliage to such an extent as to injure the crop; but where the use of Paris green has been promptly resorted to, no difficulty has been experienced in keeping this pernicious insect within due limits.

The Plum Curculio, *Conotrachelus nenuphar*, has been far less prevalent than usual, so that in many instances good crops of plums have been secured even where no efforts have been made to keep the insect in subjection. The plum crop generally has been a good one, and plum culture has consequently received a considerable impetus.

The worm of the Cabbage Butterfly, *Pieris rapæ*, although still plentiful, is no longer the terror to cabbage growers it formerly was, its natural enemies having multiplied to an extent sufficient to keep it within some reasonable degree of subjection. The general immunity which has of late prevailed regarding the Pea Weevil, *Bruchus pisi*, still continues, and pea culture has become more general. Even the Codling Worm, that perennial plague to the apple grower, has been less injurious than usual, so that our apple and pear crops have been freer than common from this obnoxious insect. Indeed there seems to have been a general scarcity of insect life during the past season of which collectors in this department of natural history in Canada generally complain.

Our large and important crops of cereals have been almost entirely free from insect pests, but this experience has not by any means been universal. In the mother country much consternation has been caused of late by the sudden appearance of the Hessian Fly in the wheat fields in considerable force, so that very serious injury has occurred in many quarters. When first noticed, specimens of the infested grain were submitted to Miss Eleanor A. Ormerod, Consulting Entomologist to the Royal Agricultural Society, who at once divined the cause, found the linseed-like chrysalis in the wheat stalks, and promptly suggested the usual remedies for this trouble, advice which, if persistently followed, will no doubt soon reduce the numbers of the insect to about their normal proportion. Mr. Whitehead also has been actively engaged in investigating this important subject and in disseminating information among farmers.

Having been absent in Europe during the spring and early summer months, I have been unable to give the usual attention to Entomological subjects. While in England I had the privilege of seeing several fine collections of insects, but none gave me more pleasure in inspection than that of the immortal Linnæus, the result of whose painstaking work is carefully preserved in the library of the Linnæan Society. Through the kindness of Dr. James Murie, the librarian, I was permitted to inspect this interesting cabinet, where every specimen bears evidence of having been mounted and named by this great master in Natural History. One could not help dwelling in thought on the marvellous progress which has attended the study of natural science since the master mind of this wonderful genius was brought to bear on the simplification of its nomenclature.

Every facility was also afforded me for examining the marvellously complete collections of insects in the natural history department of the British Museum, in Kensington, under the kind guidance of Messrs. Butler and Kirby. Both these gentlemen did all in their power to make my visits to that institution both pleasant and profitable, and showed me many kindnesses which will never be forgotten. The collections of Butterflies here are especially wonderful in their completeness. Take for instance the species composing the genera Pieris and Colias, and beginning with the plain ground color of white or yellow, one can trace the black bordering of the wings through all the different gradations from the faintest marginal outline to the heaviest and widest bands, and the transi-

tion is so gradual that it is extremely difficult to say where one species ends and another begins.

While passing through the extensive grape-growing regions in the south of France, a sharp eye was kept on the vineyards with the view of detecting evidences of Phylloxera. I am pleased to report that I saw but few indications of its presence, and from inquiries made the conclusion was reached, that this insect pest, which a short time ago was so exceedingly destructive to the vine-growing interests, is now doing comparatively little harm. It was the occasion of much regret that the limited time at my disposal would not permit me to visit any of the noted collections of insects to be found in most of the large cities of Europe.

While in London an opportunity was afforded me which I gladly availed myself of, that of visiting the South Kensington Museum in company with Miss Ormerod, and of inspecting the work of that talented lady as displayed in the cases of insects mounted, and the preparations made by her to illustrate the life history of injurious insects and to depict their ravages, forming a most interesting and complete series of object lessons in this important economic department of entomological science. I was also present at one of the monthly meetings of the Entomological Society of London, where I had the good fortune to meet many entomologists of note, including the venerable Professor Westwood, H. T. Stainton, Esq., Mr. McLachlin and others. All treated the stranger with the greatest possible courtesy and kindness, and at the same time manifested the warmest interest in everything relating to the progress of entomology in Canada.

During the past year there have appeared several important works on economic entomology, prominent among which may be mentioned the reports from the Entomological Bureau of the Department of Agriculture at Washington, under the direction of Prof. C. V. Riley, and the report of Prof. J. A. Lintner, State Entomologist of New York. In both these publications are recorded a number of useful observations and many new facts relating to the life history and habits of the species treated of. Among other important works on entomology may be mentioned the continuation of that magnificent work on the Butterflies of North America by W. H. Edwards, and a volume on the Butterflies of the Eastern States by G. H. French, of Carbondale, Illinois.

At the recent meeting of the Entomological Club of the American

Association for the Advancement of Science, held in Buffalo, New York, our Society was represented by the President, Vice-President, Secretary and Mr. J. Alston Moffat. Our Society was honored in the election of our Secretary, Mr. E. Baynes Reed, to be Secretary of the Club. The local members did all in their power to make the gathering a pleasant one, and, in addition to the ordinary meetings, special entomological excursions took place which were much enjoyed by all. The collections of the several members residing in Buffalo, and the fine library belonging to the Society of Natural Science, were freely opened to the visiting members.

The entomological collections in the American National Museum at Washington, are being rapidly augmented under the energetic direction of the curator, Mr. John B. Smith. The valuable private collections which have been acquired, added to the large amount of material constantly accumulating and being rapidly arranged, have already made it a most valuable collection of reference. In accordance with a request made by the Minister of Agriculture for the Dominion, the valuable collection of our Society was specially prepared for exhibition during last winter, and forwarded early in the spring to the Colonial and Indian Exhibition, in London, where it has been an attractive object to visitors throughout the summer. In the work of preparation, most valuable aid was rendered by one of our esteemed fellow members, Mr. J. Alston Moffat, who devoted many weeks of consecutive labor to this end. Mention should also be made of the valuable aid rendered by our esteemed Secretary-Treasurer, Mr. E. Baynes Reed, and of his son Lawrence, also of a member of our Council, Mr. J. M. Denton, for it is to the combined efforts of these several individuals that our great success has been mainly due.

In bringing these brief remarks to a close, I desire to refer to the pleasure it has given me during many years past to fill, to the best of my ability, the post of honor in which, year after year, you have been pleased to place me. Public duties of an important character which I have recently undertaken, will, from this time forward, necessarily engross all my time, and in case my name should be mentioned again in connection with the position of President, I beg to state frankly that I shall be no longer able to serve you in this capacity. I regret also that I shall be compelled to relinquish the work of editing THE CANADIAN ENTOMOLO-

GIST, a position which I have long filled with much pleasure to myself and, I trust, with some acceptance to the Society. In taking leave of the many kind friends who have rendered so much assistance to our journal by their valued contributions, I would, while sincerely thanking them for past favors, bespeak for my successor a continuance of their kind services.

With many thanks for all past kindnesses, I have the honor to be

Your obedient servant,

WM. SAUNDERS.

Moved by Mr. Fletcher, seconded by Rev. Thos. W. Fyles,

That the Society learns with regret that their esteemed friend, Prof. Saunders, has found it necessary to withdraw from the Presidency of their body, and also from the Editorship of their organ, THE CANADIAN ENTOMOLOGIST; but recognizing the importance of the work Prof. Saunders has been called upon to superintend, and the wisdom of the choice made in him by the Government, it congratulates the Professor upon this recognition of his abilities and zeal in the public service, and respectfully tenders to him a Life Membership in the Society.

The resolution was carried unanimously by a standing vote.

ELECTION OF OFFICERS.

The following named gentlemen were duly elected as officers of the Society for the ensuing year:

President—James Fletcher, Ottawa, Ont.

Vice-President—Rev. C. J. S. Bethune, M. A., Port Hope, Ont.

Sec.-Treas. and Librarian—E. Baynes Reed, London, Ont.

Council—W. H. Harrington, Ottawa; Rev. T. W. Fyles, Quebec; J. Alston Moffat, Hamilton, Ont.; G. J. Bowles, Montreal; J. M. Denton, London, Ont.

Editor CANADIAN ENTOMOLOGIST—Rev. C. J. S. Bethune, Port Hope.

Editing Committee—Wm. Saunders, Ottawa; J. M. Denton, E. Baynes Reed, London, Ont.; Capt. Gamble Geddes and Dr. White, Toronto.

Auditors—W. E. Saunders, H. P. Bock, London.

Delegate to Royal Society—W. H. Harrington, Ottawa.

On motion of Mr. E. B. Reed, seconded by Mr. A. W. Hanham, the Society resolved that all ex-Presidents of the Society be ex-officio members of the Council.

Papers were read on the following subjects :

1. Note on Sawfly Larva, *Hylotoma dulciaria;* by Rev. T. W. Fyles.

2. On the Stridulation of *Geotrupes Blackburnii;* by Mr. A. W. Hanham.

3. Notes on the Genus *Colias;* by Capt. G. Geddes.

4. The Home of *Chionobas jutta;* by Rev. T. W Fyles.

5. Notes on Larva of *Mallota posticata;* by Mr. Laurence Reed.

6. On Destruction of Insects by Electric Light ; by Professor E. W. Claypole.

An interesting letter was also read from Miss Eleanor A. Ormerod, Consulting Entomologist of the Royal Agricultural Society, with information on the recent occurrence of the Hessian Fly in England.

NOTE ON WESTERN SPHINGIDÆ.

BY A. R. GROTE, A. M.

It is one of the pleasures which we older Entomologists alone feel to its full extent, when a well written paper, full of matter, falls under our notice on a favorite subject. Such a pleasure I experienced on receiving the June No. of the "old reliable" CANADIAN ENTOMOLOGIST, and the Rev. W. J. Holland's paper on our Sphingidæ opened before me. Supplementing, as it does in various points, Professor Fernald's valuable pamphlet, it will be welcome to all interested in the beautiful study of our Hawk Moths. Upon these I need not further dwell. I wish here to point out, in reference to the interesting remarks on our Western Sphingidæ, that on page 8 of my "New Check List" I say that I am indebted to Mr. Henry Edwards for various assistance, and that "I have received from the same Entomologist information as to the synonymy of certain Western Sphingidæ." Now the only two which have any synonymy beyond the original name are *Occidentalis* and *Vancouverensis*, and these are the ones meant. In fact the only Western form I ever possessed in my own collection was a specimen of *S. perelegans*, which seemed to me undoubtedly a distinct species, nor have I ever made any study of our Western forms. In my "New Check List" I omitted the use of the dash (—), which I have generally used (following Leconte) in my shorter

lists after species unknown to me in nature. In my paper in July No., the locality, "West Coast," belongs to the preceding species *perelegans*, and a dash should follow *Vancouverensis*, as to the synonymy of which, as well as its validity as a species, I was indebted to Mr. Hy. Edwards for information. As will be seen by the absence of the dash after *perelegans*, as well as the wrong position given by me to *Vancouverensis*, the locality has been misplaced, as I give no locality to species unknown to me in this last list. Mr. Edwards quite naturally was our authority as to the Californian species. Since Mr. Butler considers the various Asiatic forms of *Triptogon* as *local*, rather than *true* species, I thought it might be so with *occidentalis;* but it may well be a mere variety, as Mr. Holland considers it. If I remember, Mr. Edwards originally described it as a geographical variety of *modesta*, which may be true if no typical *modesta* occur in California, and although this var. *occidentalis* may also be found in the East. This species will have then received four names (two applied to varieties) since *Cablei* from Louisiana, the larva on water plants, seems nothing but *modesta*, which its author did not know.

Mr. Holland's note on *Hemaris uniformis* is exceedingly opportune; from the data it may well be that it is a more northern form. But, if so, what are we to make of Mr. Hulst's assertion (for he had no material) that *Floridensis* is a *large* variety of *Thysbe?*—naturally, of course, of *uniformis*, for the band is not dentate in the Florida species. And why do we not find dentate *Buffaloensis?* if this is only a "small" variety, naturally, also, of *uniformis.* That Prof. Lintner describes the larva of *Buffaloensis* and appears to regard it as distinct (in letters Prof. Lintner kindly informed me he considered the imagos distinguishable) does not seem to have had any weight with Mr. Hulst, whose discovery of the relationship between *uniformis* and *thysbe* seems to have affected his proper study of these forms. I believe we may find that these are distinct species.

In view of this paper of Mr. Holland's, my list in July No. must be amended by referring *occidentalis*, No. 54, as a var. to *modesta*, No. 53. Further, No. 79, *oreodaphne* Hy. Ed., may be referred as a *var. min.* to No. 78, *chersis;* while the position of No. 82 must be changed to follow No. 76, *drupiferarum*, the name followed by a dash, as I do not know the species of which *Vashti* may well be a synonym, as Strecker's figure of *Imperialis* does not also quite agree with specimens of *occidentalis*, yet

is that species, and the synonyms of this author are unusually numerous in this family.

This reduces the number of our Sphingidæ to 95, which is an ample allowance, since I have my doubts as to one or two other species not studied by me. I refer to my paper, *Papilio*, 2, 172, for notes on unidentified species of Clemens, Kirby and Boisduval. I may also refer here to my pamphlet on "The Sphingidæ of the Middle States," issued separately, which may, I hope, be of value in view of my continuous studies on this group of Lepidoptera.

NOTES ON FENESICA TARQUINIUS, Fabr.

BY PROF. C. V. RILEY.

In his interesting article "On the History and the Preparatory Stages of *Fenesica tarquinius*" (Canadian Entomologist, xviii., pp. 141–153) Mr. Wm. H. Edwards makes some comments upon my article in *Science* of last April (30th), in which I announced the carnivorous habit of the larva of this species. He has been led to do so in part by the incorrect report in *Entomologica Americana* of the Proceedings of the Entomological Society of Washington for January 6th last. In that report "Mr. C. L. Johnson" is said to have observed "a lepidopterous larva feeding on a species of Aphid," but the report is incorrect both as to the fact and as to the name. Judge Lawrence C. Johnson, an old-time correspondent and for a while one of my assistants in Mississippi, was the correspondent intended, and his communication, which I was familiar with, particularly states that "he thought he saw the larva eating the plant-lice, but failed to convince himself of the fact." Mr. Lugger, in the very report quoted by Mr. Edwards (Can. Ent., xviii., 142, lines 2 and 3) expressly states that "he had never actually seen them (*Fenesica* larvæ) feeding upon the Aphids," and as he previously remarked that he had "made the same observations" as Mr. Johnson, the report in *Entomologica Americana* is inaccurate and contradictory on its face. Mr. Lugger is one of my assistants here and I knew of his observations. Mr. Edwards' statement that "all the gentlemen named had seen the larva feeding upon Aphides" is, therefore, neither justified by the facts nor by his own quotations, and whatever

obscurity he may have labored under through the careless report in *Ent. Am.* will, I hope, be hereby dissipated.

Proof of the carnivorous habit is what I was aiming at, and it is one thing to presume a probable fact; it is another thing to establish it. The presumptive fact had been recorded here for four years, but the positive fact was only obtained by Mr. Pergande at the time stated by me.

Again, in another place (*loc. cit.* p. 152, paragraph 4) Mr. Edwards's language would indicate, to one not familiar with my article, that I had said something to the effect that no other butterfly had, or could have, a carnivorous larva. He makes me say in fact that "this is the only butterfly known whose larva is carnivorous"; whereas my language was, "so far as I can find, there is not another recorded carnivorous butterfly larva." No one could justly use his language who was not familiar with the larva of every butterfly known; whereas my remark simply emphasizes mine as the first record of such a carnivorous butterfly larva and leaves the implication that others may be found.

I was much interested in the experience of Mr. Edwards and Miss Morton, not only because it confirms the carnivorous habit of the species announced in my paper, but because it adds so many interesting observations which tend to prove the carnivorous habit normal and not exceptional.

Mr. Edwards has asked me to publish the facts we have recorded here in the C. E.

Mr. Pergande's notes were merely chronological and colorational, connected with the preserved egg-shells and about 30 larvæ of all sizes. I did not use them last spring because I had not time to go over the material and draw up full descriptions that should combine structure as well as coloration. Ill health has since prevented, and with Mr. Edwards's very full descriptions there is no longer the necessity. In brief I may state, however, that Mr. Pergande's notes show that:

July 8, 1880, the larvæ were found in the leaf curls of *Pemphigus (fraxinifolii)* on Ash, and that the larvæ died without feeding on the leaves that were placed with them.

In 1881 search was again made for the larvæ on the same tree without finding any.

Aug. 23rd, 1882, three larvæ were found on a twig of Witch Hazel;

they were not feeding when seen and attempts to feed them upon leaves, with which they were placed in a jar, failed. The larvæ died.

Oct. 2, 1882, several larvæ were noticed with *Schizoneura tessellata*. They were intermixed with the plant-lice and not readily observed, but seemed to hide among the mass of plant-lice. They were brought home with some of the Aphids for experiment, and while the butterfly larvæ were actively crawling about for some days, they all died without its being noticed that they fed upon the *Schizoneura*.

Sept. 18, 1884, again a few larvæ were found among the same *Schizoneura*. They were placed in a jar with the branch containing some of the plant-lice. Subsequently the larvæ were found crawling about and the lice had disappeared, some of them having apparently been eaten. This gave rise to a conviction that the butterfly larvæ feed upon the lice, but they all died without the fact being proven.

Aug. 8, 1885, the larvæ were again found of all sizes among *Pemphigus imbricator*. They were quite active, crawling over the plant-lice, and stopped as soon as the twig was touched.

The egg-shells were at the same time observed and the actual fact of feeding upon the lice was proven by direct observation.

August 12th several had changed to pupæ, and by Aug. 20th four imagos of *tarquinius* had issued.

I have already sent the substance of this communication to Mr. Edwards, but believe that it will have interest, in connection with his article, for the readers of THE CANADIAN ENTOMOLOGIST.

Washington, D. C., Nov. 10, 1886.

NOTE ON FENESICA TARQUINIUS FABR.

BY GEORGE HALEY, BROWNFIELD, MAINE.

I have seen this butterfly light on a species of Aphis, *Schizoneura tessellata*, found on Alnus in crowds on the bark, and from the position of its abdomen it seemed to be going to lay an egg among the plant-lice, but seeing me, she did not. Afterwards I scraped some of these larvæ off a twig of Alder and found a couple of larvæ; I sent them to Mr. W. H. Edwards, and he said that they were *F. tarquinius*, as I thought. The

larvæ were under the bodies of the plant-lice, covered with a thin network of silk to keep the woolly secretion of the Aphides away from them. They were only half grown. On another occasion I found two full-grown larvæ among the plant-lice in the same position as the first. One of these changed to a chrysalis and I have it now. It is hung up like other chrysalids of the family Lycænidæ, and has a peculiar humped back. This butterfly is always wandering round Alder bushes with a peculiar flopping motion, as though its wings were too large for its body. After I sent the larvæ to Mr. Edwards, saying that I thought they fed on the plant-lice, as there were many dead bodies, or skins, of the lice where I found the larvæ; I saw in the June (1886) number of the *American Naturalist* that the larvæ probably fed on this species of Aphis, also on *Pemphigus fraxinifolii*, found on the twigs of beech trees. Next summer I intend to observe the habits of this butterfly and its larvæ more closely.

THE OPERATIONS OF A PREHISTORIC BEETLE.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Some years ago, I received from Prof. G. J. Hinde, of Toronto, a twig of juniper about as thick as, and a little longer than, one's finger, which he had taken from interglacial deposits at Scarboro', near Toronto, and which showed the marks where beetles had bored the surface just beneath where the bark had been. From the same locality a number of remains of beetles have also been found, mostly Carabidæ, two of which I described at the time as new species of Loricera and Loxandrus. The others still remain unpublished, but there are none among them which could have made these borings, as these are evidently the peculiar work of some species of Scolytidæ, and apparently one of the Hylurgini, though in our very imperfect knowledge of the characteristics of the mines made by existing forms of this family, it is difficult to pronounce on its relations.

There are parts of at least six different sets of borings on this small twig, and all are evidently the work of one species. The mating-chamber is more or less triangular, generally equiangular or tridentate, one angle

upward. From two of these chambers no main galleries arise; there may be some special reason for this, since they are much narrower and much more deeply excavated than the ordinary chambers; they were perhaps unsatisfactory to the constructor and left unfinished.

From the other mating-chambers, which are about three millimetres in diameter, the main galleries generally run obliquely, but more nearly transversely than longitudinally to the stem; they are subequal and take their rise one on each side of the mating-chamber at the lateral angles, and run in exactly or almost exactly opposite directions. In one case, however, there is but one main gallery, and in another they are at right angles to each other, one being perpendicular; in this latter case, the mating-chamber is reversed, the apex being downward. These main galleries vary from one and a half to eight millimetres long, and are slightly more than a millimetre wide, with dentate edges, where the eggs were probably laid by the parent.

At least this is the general custom with the Scolytidæ; but here, as in some other rare cases, the young larvæ do not commence to mine, each at right angles to the main gallery, but collect together and all start from one spot, the summit of the mating-chamber or the extremity of one of the galleries, and thence burrow in irregular and somewhat interlacing mines along the stem, and all apparently either upward or else downward, not, as is usually the case, in both directions; apparently they may often turn upon their course again and again, or they may mine in an almost perfectly straight line, or in a tortuous line, for half a decimeter. In that whole distance the mine will scarcely have doubled in width with the growth of the larva, and in many cases it is difficult to tell in which direction the larva moved. The greatest width of these larval mines is scarcely more than half a millimetre, and they vary greatly in depth. The connection between the main gallery and the mines is often obscure, owing doubtless to the larvæ burrowing, while young, more in the bark than in the wood. In one case there is a mating-chamber and a pair of short galleries, but nothing more; here, apparently, the mother fell a prey to some enemy before accomplishing her purpose.

This mode of origin of the larval mines seems to be different from anything described hitherto, and therefore it is difficult to decide to what group the insect making the mine belonged. In the Museum of Comparative Zoology at Cambridge is a mine of the European *Scolytus rugu-*

losus on cherry, which shows a somewhat similar distribution of the larval mines, which emerge and diverge from one point of the mating-chamber; but the main galleries are reduced to almost nothing, and the normal mine of this species, as figured by Ratzeburg, shows nothing of the kind.

Of course it is entirely possible that the species which constructed these mines is still living and doing similar work. If so, it is probably a northern species, and my object in publishing this account is to ask if any one in Canada can produce similar burrows on juniper or some allied conifer, made by existing beetles. I have for years searched for such in vain, on every occasion which offered. The nearest approach to it that I can find is in the mines of *Phlœosinus dentatus* (Say), figured by Packard.

NOTE ON DICERCA DIVARICATA, Say.

BY F. B. CAULFIELD, MONTREAL, P. Q.

On the 12th of last June I observed a female of this species on a dead Maple. She was creeping down the tree, feeling the interstices of the bark with her ovipositor, but apparently without finding a suitable place, as no eggs were deposited so far as I could perceive. On the 19th, I observed another female, also on Maple. She was resting head downwards with the terminal segments of the abdomen slightly inclined, the ovipositor extended at a right angle with the body and placed in an old hole of some borer. She remained in this position for several minutes, the ovipositor being alternately dilated and contracted as if eggs were passing through. After she had gone away, I examined the place and found that, at a little distance from the surface, the hole was stopped with a smooth grayish substance. Not having a knife about me, I tried to remove it with a stalk of grass, but only succeeded in breaking it up into a yellowish fluid. I have no doubt that the creature deposited an egg, or eggs, and covered them with a kind of cement. Whether this is the usual manner in which the species oviposits I cannot say. The only reference that I have seen is in Packard's Insects Injurious to Forest and Shade Trees," where he says, speaking of insects attacking beech :— " Observed by Mr. George Hunt laying its eggs in the bark in July."

ON THE GEOGRAPHICAL DISTRIBUTION OF NORTH AMERICAN LEPIDOPTERA.

BY AUG. R. GROTE, A. M.

(Continued.)

The study of the forms referable to the first or European element in the North American Moths, is complicated by the circumstance of the great range in the character and amount of the differences separating the related species now living so widely apart. These related species are found, in fact, to offer also difficulties as to their correct nomenclature. We have seen that the term "representative species," like that of "prophetic types," hides the real significance of the inter-resemblance which is that of a common descent. In naming these "representative" forms we must be guided by the rule that where the differences are such that the species would be considered distinct if members of a common fauna, a different specific title must be given them, but where these differences are slight, and what, under the same supposition, would be considered only varietal, the species must be considered as still identical, though separated so long in time and by so wide a space. The study of those forms which are practically identical is, as we have seen, further complicated by the difficulty of deciding as to whether they may have been introduced since the discovery of the New World by the Spaniards, or whether the species have continued unaltered since the Tertiary in both America and Europe. While certain species such as *Scoliopteryx* are undoubtedly in this latter case, it is less easy to feel so sure with regard to this in instances like *Dipterygia Pinastri* and the various identical forms of *Agrotis*, but on the whole I am inclined to believe that the number of species artificially exchanged is very small, and that these identical species have simply proved more constant and are of an older type than the rest. An agent which, however, must not be omitted in the interchange of species of insects is the voluntary importation by collectors for purposes of acclimatization, deception, or from a desire to destroy, through the introduction of injurious species, the crops of another country. It seems quite clear that the Natural History of most insects precludes the idea of their importation in an accidental way by commerce. It seems certain that the Colorado Potato Beetle never found its way to Europe in cargoes of vegetable provisions. Where it was found on the Continent it was evi-

dently sown by mischievous persons receiving live specimens through the mails. In the Moths, the wood-boring species may be introduced by accident, but, unless in such cases as the Currant Clear Wing *(Aegeria)*, such an introduction would be usually futile for the establishment of the species. Specimens of the Wood Leopard, *Zeuzera Aesculi*, are said thus to have been found about New York, and even the Goat Moth, *Cossus Ligniperda*, is stated to have been so found. Again, in Wood's "Index Entomologicus," are figures of one or two of our Noctuidæ, the originals of which, if authentic, must have been accidentally introduced into England, and disappeared again without leaving progeny behind them. One or two cases have fallen under my notice where deception has evidently been intended, but the naturalist, from his knowledge of the habits of the insect, will quickly detect such frauds. One case of reported identity I regret not to have been able to verify. It is that of the European *Catocala Nupta*, said to have been found on Long Island. Now the genus *Catocala* is peculiar to the Northern Hemisphere, and our species and the European have undoubtedly a common ancestry. But the remarkable fact is that our forms have differentiated widely and multiplied exceedingly, so that we have fresh Groups and a much greater number of species compared with Europe. That, therefore, one form of *Catocala* should have remained constant is, to me, incredible, and I shall prefer to believe that the reported American specimens of *C. Nupta* are the result of recent importation or of deception. We have witnessed the acclimatization of the Chinese Silk Worm, *Philosamia Cynthia*, on the Ailanthus trees in the vicinity of New York and Philadelphia, and, in the case of the Spinners, cocoon-making species, it seems likely that the wholesale transference of such species in the pupal state would result in the permanence of the form in the wild state in the new locality. But the very difficulty which generally attends the introduction of new species into a fresh locality, suggests that most of the species common to America and Europe have simply remained unaltered since prehistoric ages. The pattern of ornamentation has remained constant, while Dr. Speyer has noticed a shading or quality in the colors which renders the specimens still distinguishable by the practised eye, and which is evidently due to the differences in light and humidity. But, as in the case of *Catocala Nupta*, the naturalist will have to take into consideration the whole range of special facts to decide any one case where historic evidence is totally wanting.

The Moths are unequally represented, both as to the number of species and that of individuals, over our territory. The barren and hot lands of the South-west nourish few species, while the lands along the Eastern coast, from Massachusetts to Virginia, seem to be among the most prolific in the variety of kinds. Certain species swarm in certain localities, as one or two kinds of *Cataclysta* on the islands in the Niagara River and elsewhere in the North. In Alabama, aside from the Cotton Moth, it was at certain times hardly possible for me to read at night by light for the swarms of *Acrolophus agrotipennella* and *mortipennella*, which fluttered over the table and the page. Colorado is a rich field for Moths, as also certain portions of Texas, judging from the collections of Belfrage (Bosque County) and Boll. The pine lands of the Southern States are on the whole poor in species, and, in parts of North and South Carolina, I found the collecting poor, without, however, preventing the occurrence of many interesting Moths. Practically we have one common fauna, broken by the Alleghanies and other mountain ranges, until we get as far South as the tropical colony in Florida, while in Texas we meet South Californian species, besides the first indications of the tropical Mexican fauna of the low lands, which extends its range along the coast so far north as Louisiana. The Moths go hand in hand with the vegetation and the flowers, so that rich botanical districts are also rich entomologically. Swampy or boggy spots yield many peculiar moths; the different species of *Sarracenia*, the Pitcher-plants, both at the North and in the South, yield several curious Moths, among which the species of *Exyra*, a genus of Owlet Moths, the larvæ of which feed on the folded leaves, are the most noteworthy and the prettiest in color.

In a final consideration of the second, or South American element, in our fauna of Moths, we must distinguish, as we have seen, between those forms which have effected a more or less precarious lodgment in our territory and those which, through distinct species, have become thoroughly amalgamated with the North American fauna. The occurrence of such species as *Syllectra mirandalis* or *erycata*, or *Thysamia Zenobia*, is undoubtedly accidental and may not occur again for years. On the other hand, there is a stream of certain species which yearly reach points in our territory, such as *Argeus Labruscæ*, without leaving progeny; there are then other species which have attained a more or less extended foothold, such as the Owlet Moths belonging to the genera *Anomis*, *Aletia*,

etc. With these may be reckoned the members of the South Florida colony of Moths, species like *Cautethia Grotei*, also found in Cuba, and many others. Finally, the thoroughly domiciled Southern element is seen in such genera as *Hyperchiria*, of which we have four or five species, the most widely disseminated of which is *H. Io*, a form not reaching the tropics and becoming somewhat variable in the Southern States. This genus is numerous in South and Central American species. Our prettiest species of *Hyperchiria* is, perhaps, *H. Zephyria*, from New Mexico and Arizona, in which the dark primaries have a white stripe running from apex to middle of internal margin. The hind wings are yellow with a large central ocellus and pink hairs at base; the thorax is fuscous, marked with white on the sides, and the abdomen is fawn color shaded above with red.

(To be Continued.)

NOTICE OF DR. WILH. MULLER'S WORK ON THE SOUTH AMERICAN LARVÆ OF THE NYMPHALIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Readers of THE CANADIAN ENTOMOLOGIST have, no doubt, through the papers of W. H. Edwards, followed with interest the discovery of so many facts bearing on the evolution of species in the Butterflies. We have now a work by a German writer of remarkable industry and ability, on the larval peculiarities of the Nymphalidæ, which deserves the study of all interested in Lepidopterology in America. The work is adorned by four plain lithographic plates of the caterpillars and their peculiar structure, of such fineness and softness of execution that, with all my experience, I hardly know where to find their equal. The work itself is a separate part of my friend Prof. Spengel's very useful "Jahrbücher," a zoological publication which deserves to be largely encouraged. The publication may be obtained at the office of Gustav Fischer, Jena, Germany, and this work on the Nymphalidæ costs about three dollars (11 marks). The book itself (252 pp.) is too lengthy to be adequately reviewed here. It is a minute study, throwing light on the genealogy of the family from the structure of the caterpillars, and it is conducted with an ability which is simply marvellous. Only in this way can we become acquainted with the ancestry of our present Lepidoptera, a study which is perhaps the most fascinating suggested by these insects, and which has only become possible since Mr. Wallace and Mr. Darwin opened the doors to this field of speculative inquiry.

The Canadian Entomologist.

VOL. XVIII. LONDON, NOVEMBER, 1886. No. 11

DESCRIPTION OF THE PREPARATORY STAGES OF COENONYMPHA GALACTINUS, Boisduval.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Egg.—Conical, broadly truncated, the flat top covered with a low network of irregular meshes, very fine about the micropyle; the lower part rounded, almost hemispherical; the upper part of side and to about two thirds the distance to base ribbed vertically,—about forty low ribs, with fine transverse lines between them; below the ribs there is an irregular network; color yellow-green. Duration of this stage about 13 days.

Young Larva.—At 24 hours from egg, length .1 inch; thickest at 2 and 3. Dorsum and sides sloping regularly to 13, ending in two short conical tails, which meet at base; color pale yellow-green, under side more yellow; a mid-dorsal brown line, and three such lines on the side, the lowest running with spiracles, the next near it, the third at a little greater distance from second and in fact, sub-dorsal; on each segment are white clubbed processes, each of which rises from a rounded brown tubercle; these form three rows on either side, one sub-dorsal, one mid-lateral, with a demi row between the two on three anterior segments; in these rows there is one process to the segment; the third row is at base, over feet and legs, two processes to each from 5 to 11, one each on 3, 4; on 2 and 12, 13, two hairs to each, in place of processes; these lower processes are smaller than elsewhere, and less bent, but are turned down; the upper rows are bent back, except on 2, there forward; feet and legs color of under side; head one half broader than 2, rounded, narrowing towards top, depressed at top; color pale pink; over the face are a few white tubercles with processes like those upon body, bent down. Duration of this stage 12 days.

After First Moult.—At 24 hours, length .19 inch; nearly same shape; color yellow-green; covered with fine, irregular white tubercles, each of which gives a very short hair, all except on 2 turned down and back; the

mid-dorsal line green; three green lines on side; the basal ridge yellow; head sub-globose, a little broader than 2, depressed at top; the surface much covered with fine white tubercles and short hairs; color green, darker than body. To next moult 7 days.

After Second Moult.—At 18 hours, length .32 inch; generally as at second stage; color more yellow, greenish-yellow, the tails reddish. To next moult 10 days.

After Third Moult.—At 24 hours, .56 inch; shape as at previous stage. Soon after this moult some of the larvæ gradually changed to buff and red, the others remaining green.

Mature Larva.—Length .84 to 1.06 inch; slender, scarcely arched dorsally, of even height and width from 3 to 7 or 8, then tapering gradually; ending in two short conical tails which meet at base, and are rough with tuberculations; whole upper surface of body covered thickly with fine sub-conical white tubercles, each of which gives out a fine short hair, so that the surface is downy; these hairs are either tapering, or clubbed, or cylindrical with round tips; color yellow-green striped longitudinally with yellow, there being two narrow, pale stripes near together on mid-side, and a heavier and deeper basal stripe; on mid-dorsum a dark green line edged by paler green than elsewhere; the tails tipped with red; under side, feet and legs bluish-green; head broader than 2, sub-globose, narrowing towards top, a little depressed at suture, finely granulated, and with a very short down; color greenish-yellow, the mandibles brown, the principal ocellus emerald in brown ring.

Or the body was reddish-buff, the stripes yellow; the tails red; under side red-brown; feet green, legs red-brown; head greenish-yellow, with a tint of brown. In one larva the sides stripes were nearly obliterated, leaving the side almost solid buff. From third moult to pupation about 12 days.

Chrysalis.—From green larva: length .36 inch; breadth at mesonotum .14, at abdomen .16 inch; shape of Satyrus *Alope*, the outline of ventral side more straight, the abdomen more swollen and less tapering; cylindrical, stout, the upper end truncated, the abdomen swollen, conical at extremity; head case narrow, ending in a sharp cross ridge which is a little arched at top, its sides excavated roundly; mesonotum prominent, arched, the carina rounded transversely, the sides slightly convex, followed by a shallow depression; color yellow-green, over dorsum and abdomen

finely specked with white; marked by nine black stripes of irregular length; of these there is one on dorsal edge of each wing case from base to inner angle of wing; a curved stripe on middle of each wing reaching the hind margin; a short stripe on the hind margin on ventral side of the curved stripe; two short parallel ventral stripes on antennæ cases, a longer one on ventral side between the wings; besides these there is an imperfectly colored narrow stripe on either side at posterior end; top of head case whitish with a dash of black below this on dorsal side.

From buff larva: color pinkish-brown, no black stripes, but the curved wing stripes appear in deeper brown, and along dorsal side of wing cases the same.

Another chrysalis from a buff larva was green, fully striped, but the wing cases were buff.

Another from buff larva was pinkish at first, with three darker stripes on dorsum, one on middle below the excavation, one short one on either side this, and all the stripes first described were also present, but were faint brown; this chrysalis in a day or two had changed to full green, with the nine black stripes, but lost the three additional ones.

Another was wholly green, no stripes at all. So that there is much variation in the number of these stripes, as well as in color of the chrysalis. Duration of this stage 11 and 12 days. Result wholly form CALIFORNICUS Bd.

GALACTINUS was described by Dr. Boisduval in 1852, together with *Californicus*. Of the latter he merely says: "It is found here and there in shaded places." Of the other: "Inhabits the mountains in the north, and appears to be rare." The two forms, as is seen from what I have stated above, are of one species, *Galactinus* being the winter, *Californicus* the summer form. It appears to be a common species near San Francisco. On 1st May, 1885, I received 13 eggs laid by *Galactinus* from Prof. J. J. Rivers, at Berkeley, and which were mailed 23rd April. Hatching began 5th May. On 7th, I received another lot, which began to hatch on 8th. By 11th, all had hatched. On 17th May, the first moult was passed by some of the larvæ; on 24th May, the second moult; on 3rd June, the third. The first pupation took place 15th June, and first butterfly came out 26th June. From laying of eggs to imago 65 days, the egg stage being 13, larval 41, chrysalis 11. The growth was rapid for a Satyrid, and in contrast with the tedious growth of Coen. *Ochracea*. The

larvæ feed on any species of lawn grass in confinement. I had grass in flower pot, covered by a muslin bag, and changed as it was eaten or lost its freshness. In all I brought seven larvæ to pupation, but at every stage had put one or two in alcohol. The number of moults was three, but probably the winter larvæ pass a fourth in spring, as does the larva of Coen. *Ampelos*. In general appearance the larvæ and chrysalids much resemble the genus Satyrus, but the processes on the young larvæ have nothing of the fish-bone character of *Alope*. The peculiar stripes on the chrysalis seem to be a generic character, as *Ampelos* and the European *C. Davus* (according to Mr. Wm. Buckler, Larvæ of British Butterflies, vol. 1, page 36, plate 6). But in *Davus* it is said that the pupa was light green at first, and "in a few days showed brown streaks on the edges and centre of the wing covers and at the tip of the tail." The figure on plate shows pale stripes to same extent and number as on *Galactinus*. The eggs are quite different from eggs of Satyrus, and still more unlike Neonympha, having a great number of ribs, which cover only the upper two thirds of sides.

NOTES ON THREE SMALL COLLECTIONS OF DIURNAL LEPIDOPTERA MADE DURING THE SUMMER OF 1886.

BY GAMBLE GEDDES, TORONTO.

The following species were taken by Capt. Gilpin Brown (late H. M. 92nd Regiment) in the Island of Newfoundland, during the months of July and August last:

1. Grapta Faunus, *Edw.*
2. Chrysophanus Florus, *Edw.* (or C. Helloides, *Boisd.*—uncertain.)
3. C. Epixanthe, *Bd.–Lec.*
4. Argynnis Atlantis, *Edw.*
5. Melitæa Harrisii, *Scud.*
6. Phyciodes Tharos, *Drury.*
7. Colias Interior, *Scud.*
8. *ib. var.* Laurentina, *Scud.*
9. Cœnonympha Inornata, *Edw.*

Strange to say, no specimens of *Lycæna Couperii* or *Papilio Brevicauda* were seen, though possibly it was too late in the season for both species.

The variety *Laurentina* of *Colias*, found by Captain Brown, is interesting from the fact that it is the identical species from which Mr. Scudder made his descriptions and observations in 1876. It has a very distinct appearance, being much rounder in the outline of its wings—whether open or closed—than any of the species of *Colias* with which I am familiar.

It is interesting also to find *Cœnonympha Inornata* in Newfoundland; this species is quite different from the *C. inornata*, so named by Mr. W. H. Edwards, from the prairies of our North-west. The difference is so marked that I am inclined to think that the butterfly that is so common in the North-west is *C. Ochracea*, Edw., and that *Inornata* proper does not occur there. This conclusion is arrived at after consulting abundant material, over one hundred specimens having been examined.

II. At Lake Superior, in the neighborhood of the Kaministiquia River, I took the following species:

1. Grapta Progne, *Cram.*
2. Colias Edwardsii, *Behr.* ♂.
3. " Interior, *Scud.*
4. " Philodice, *Godt.*
5. " Hagenii, *Edw.*
6. " Eurytheme, *Boisd.* (seen in numbers, but not taken).
7. Pieris Virginiensis, *Edw.*
8. Argynnis Bellona, *Fab.*
9. " Chariclea, *Schneid.*—quite common.
10. " Atlantis, *Edw.*
11. " Myrina, *Cram.*

These lists are published for the sake of the localities, as I believe there is no authenticated report of the appearance of *Colias Edwardsii* so far east, or of *C. Hagenii;* also *Argynnis Chariclea*, or *A. Boisduvalii*, which I have found at a high altitude in the Rocky Mountains, but not so far south and east as Port Arthur, on Lake Superior.

III. A small collection of butterflies was made last summer in the Hudson Bay Straits by Mr. Frank Fitz Payne, of the Toronto Observatory, who accompanied Lieut. Gordon's expedition on the "Alert" to the Arctic Regions. The specimens were kindly identified by Mr. W. H. Edwards,

of Coalburgh, West Va. They can be easily referred to at any time in my collection.

Although Mr. Payne devoted much of his time to the collection of insects, I regret to say that nothing absolutely new to our present list of diurnals of N. America has come to hand. With the exception of one curious green ♀ of *Colias Hecla*, Lef., Mr. Edwards had seen all the species before. As this ♀ was the only one out of many that had this peculiar appearance, it may perhaps turn out to be something new—there being a great similarity between all the others.

The *Chionobas* vary greatly in size and appearance of apparently the same species—*Chionobas Taygeta* and *Chionobas Crambis* particularly. In *Chionobas Semidea* the shades of gray in some are quite light in color, and in others run almost into black.

The following is a complete list of the butterflies taken :

1. Colias Hecla, *Lef.*
2. " Nastes, *Bd.*
3. Argynnis Polaris, *Bd.*
4. " Freya, *Thunb.*
5. Chionobas Semidea, *Say.*
6. " Crambis, *Frey*
7. " Taygeta, *Hüb.*
8. Lycæna Aquilo, *Bd.*

I hope at no distant date to be able to give a list of the moths, and as far as possible of the Hymenoptera and Diptera. Strange to say, no Coleoptera were seen at all.

CORRECTIONS TO MY PAPER IN JULY NO. OF CANADIAN ENTOMOLOGIST.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

On pages 121-122 the generic term *Lepisesia* is twice written wrongly, "*Lipisesia.*" To my statement with regard to the food plants of the *Smerinthinæ*, must be added that several unocellated genera feed on forest trees, such as poplar, linden, oak, etc. I have taken our *geminatus* on willow; my statement as to fruit trees *(Rosaceæ, Caryæ)* gives the

general food of *Cressonia*, *Calasymbolus*, *Smerinthus* and *Paonias*. I would likewise add to my remarks as to the sequence of the groups that they seem to me to form two series; the first embracing the *Macroglossinæ*, *Chærocampinæ* and *Smerinthinæ;* the second the *Acherontinæ* and *Sphinginæ;* the members of each series resembling each other more than the members of the opposed series. With regard to my List, p. 126 et seq., I would say that the manuscript was in the main long completed, perhaps nearly a year before I received Prof. Fernald's excellent paper. After receiving it I merely so far corrected and added to my MSS. This accounts for the resemblances between my paper on page 121 and my preface to the List, in both of which I bring out the same points with regard to the groups. In the List itself "*Noctuiformis* ‡ H.-Sch.," should be cited in the synonymy of *Cautethia Grotei* Hy. Ed. It has been shown that the Cuban and Floridian species are the same, but Walker's *Noctuiformis* from St. Domingo is a different species. I only accidentally saw the description of *S. Separatus;* and possibly some species described within the last three years has escaped me during my absence from home.

Oct. 23, 1886.

NOTES ON ABNORMAL TYPES OF THE LARVA OF SMERINTHUS MYOPS.

BY ROBERT BUNKER, ROCHESTER, N. Y.

For three years past I have reared this species from eggs and young worms, and in no instance have they agreed with descriptions I have met with. Two years ago I had a brood of eight. Three of them had six spots—three on each side—two four spots, one two spots, and two without spots.

Last year I had nine, not one of which had the least semblance of a spot, and were lighter green than those of the year before. This year the brood consisted of seven, two of which were unspotted, one with four, three with two, and one with a single spot.

Where there were but two spots they were invariably on the third segment. In case of four spots on the third and seventh. When six occurred the intermediate ones occupied the fifth segment. The unique

that claimed but one spot was polite enough to carry the *insignia of rank* on the right side of the third segment.

The immaculate specimens were destitute of oblique lines on the sides, or at least the lines were so faint they could scarcely be seen.

The two broods produced fine specimens. The third has entered the ground, and no doubt will appear in their rich dark brown dress next spring. Smith and Abbott describe the spots as reddish brown; other writers as rust red. My specimens were bright crimson or cardinal red. Stigmatal spots olive green.

It will be seen from the foregoing that the larva of *Myops* is exceedingly variable; but that out of twenty-four specimens not an individual answered to the description given by authors is remarkable.

A NEW NOXIOUS CAPSID.

BY P. R. UHLER, BALTIMORE, MD.

Lygus monachus, n. sp.

Long oval, pale green or testaceous, coarsely punctate above, sericeous pubescent. Face convex, highly polished, bald; base of vertex with a longitudinal impressed line, towards which a similar line runs obliquely forward each side from the inner corner of the eye; antennæ sparsely and minutely pubescent; basal joint thickest, a little longer than the head, tapering at base; second joint thrice as long as the basal, infuscated, and a little enlarged towards the tip; third and fourth setaceous, both together not as long as the second. Pronotum highly polished, convex, coarsely punctate in transverse wavy lines, each side with a dark brown vitta, or long spot; lateral margins smooth, callous at base, the humeral angles subacute; callosities prominent, convex, almost confluent on the middle; lateral flap of pronotum irregularly punctate. Pectoral pieces pale, impunctate. Legs pale green, feebly pubescent; apex of posterior femur usually with one or two fuscous bands, tip of tarsi and the nails black. Scutellum moderately convex, excavated at base, transversely obselete, punctate, more or less infuscated. Corium coarsely transversely vastrate-punctate, the clavus more or less infuscated, sometimes with all but the margins covered with dark brown; corium usually with a trans-

verse dark brown arc next the posterior border; cuneus long and wide, the incised base fuscous and the inner margin brown; membrane pale testaceous, with two or more dark clouded spots, the inner submargin of the principal areole, a spot at its tip and the base next the cuneus all more or less fuscous. Ventor pale greenish.

Length of body, ♀ 5 millims.; to tip of wing covers 7 millims.; width of pronotum, 2 millims. ♂. Length of body, 4 millims.; to tip of wing covers 5½ millims.; width of pronotum, 1¾ millims.

This has proved to be a very common insect in various localities.

Mr. Cassino collected numerous specimens around Peabody, Mass. Mr. Bolter sent to me a pair from Illinois and Missouri, and I have taken it from Alders, Maples and many other kinds of small trees and shrubs on Cape Ann, Mass., also near the base of the White Mountains in New Hampshire, and near Quebec, Canada.

Mr. Forbes has also forwarded to me specimens from near Normal, Ill. It resembles *Lygus invitus*, Say., and presents several of the color varieties common to that species, but it is a much larger insect, of a longer figure, and has a more flattened upper surface.

OCCURRENCE OF THE CHINCH-BUG (BLISSUS LEUCOPTERUS, Say) AT BUFFALO, N. Y.

BY E. P. VAN DUZEE.

This pernicious insect has been very abundant here for many years. As early as 1874 I found it in considerable numbers among moss on dry, grassy hill-sides at Lancaster, N. Y. This season (1886) it was remarkably abundant in a dry upland hay field near the same locality. I have also taken it at Ridgeway, Ont. Ordinarily the short winged form predominates, but in hot, dry summers, such as those of 1881 and 1886, they mostly acquire fully developed membranes. I find on comparison with a lot of perhaps one hundred fully developed examples from Kansas, that ours are quite uniformly larger and more robust, with longer hairs on the pronotum.

Prof. J. A. Lintner says *(2nd Annual Report N. Y. State Ent., page 150)* that, previous to its appearance in St. Lawrence county in 1882, the only recorded occurrence of this insect in New York State is that mentioned by Dr. Fitch *(2nd Report, 1856, p. 287)*. From this it appears that it has not been recorded, if indeed it occurs generally in this State. Its early introduction at this locality is only natural, considering the immense grain traffic which yearly passes through this city direct from the infected States of the West, on its way to the seaboard; yet it does seem strange that its first appearance in sufficient numbers to attract general attention should have been in Northern New York, quite aside from any of the main lines of transportation, unless, as Prof. Riley suggests *(Science, vol. II., p. 621)*, it be a native species, which, through an unusual series of favoring circumstances, has increased enormously in certain localities. That it has not been reported as an injurious insect in this locality seems to me no proof that it has not been injurious. To be sure, it has not appeared in such overwhelming numbers as to force itself upon public notice as in other places, but from my own observations I think that no inconsiderable part of the injury to hay fields charged to the dry weather is in reality the work of this insect, or rather the combined effect of the two. For example, the hay field at Lancaster mentioned above, which last year yielded an abundant crop, is literally ruined and will have to be plowed under in the spring, while other fields less protected, where the bug was not found in numbers, escaped injury; and I know of several other fields near this city apparently affected in the same manner.

I have always found this insect in hay fields, generally in timothy or clover, occasionally among wild grasses. I do not recollect ever having taken a specimen in a grain field of any kind. If it has so thoroughly acquired the habit of subsisting upon the cultivated cereals in the West, why should it not affect the same plants here, especially if it has been introduced from that section of the country through commercial transportation? It would be highly interesting to learn of its occurrence in this State at localities distant from main railroad lines.

LIST OF ORTHOPTERA TAKEN IN THE VICINITY OF MONTREAL, P. Q.

BY F. B. CAULFIELD.

BLATTIDÆ.

*Stylopyga orientalis, *Linn.* Common in houses; have also taken it under stones in a lane behind a bakery in summer.

Ischnoptera pennsylvanica, *De Geer.* Not common. I took a specimen under bark of a stump on Montreal Mountain some years since, and on June 4th, 1885, I took three specimens under bark of a stump at Abbotsford, P. Q.

Temnopteryx marginata. Rare. Two specimens taken under bark of a fallen tree on Montreal Mountain.

*Ectobia Germanica, *Stephens.* Common in houses in the city of Montreal. Has been so to my knowledge for the last fifteen years; how much longer I cannot say.

PHASMIDÆ.

*Diapheromera femorata, *Say.* Common at Montreal.

GRYLLIDÆ.

Gryllus neglectus? *Scudd.* Abundant. Specimens in the larval stage may be found under stones as soon as the snow has melted. Have passed through their moults by the end of May, when they may be heard "shrilling." Have not heard them during July. Again heard beginning of August and from that to end of the season. Several heard shrilling October 30th, 1886.

Gryllus luctuosus, *Serv.* Very rare; only two specimens taken.

Gryllus domesticus, *Linn.* Common in bake-houses.

Nemobius vittatus? *Harr.* Abundant. Its song commences about the first of August and lasts until the end of season; heard shrilling October 30th, 1886.

Nemobius fasciatus *De Geer.* Not so common as last species.

Œcanthus niveus, *Serv.* Very common; season from about the first of August to about the middle of October.

LOCUSTIDÆ.

Ceuthophilus maculosus, *Harr.* Common under stones and bark of dead trees in damp situations.
Amblyconypha oblongifolia, *Harr.* Not common.
Phaneroptera curvicauda, *Serv.* Not uncommon.
*Xiphidium fasciatum, *Serv.* Common in damp fields.
Xiphidium brevipennis, *Scudd.* Common in same localities as last species.
Orchelimum agile, *De Geer.* Common in tufts of herbage in damp places.

ACRIDIDÆ.

Stenobothrus curtipennis, *Harr.* Very common in fields during latter part of summer and fall.
*Tragocephala infuscata, *Harr.* Common during spring and early summer; *var.* viridifasciata, not so common.
Melanoplus femur-rubrum, *Burm.* Very common during the end of summer and fall.
Melanoplus femoratus, *Burm.* Common during latter part of summer.
Dissostria carolina, *Burm.* Abundant during latter part of summer.
Œdipoda verruculata, *Scud.* Not uncommon.
*Œdipoda phœnicoptera, *Germ.* Very rare, one specimen taken on Montreal Mountain, some years since.
Eucoptolophus sordidus, *Burm.* Not uncommon in dry fields during the latter part of summer; flies with a rustling sound like Tragocephala.
Camnula pellucida, *Scudder.* Abundant; appears about the middle of June and lasts until September.
Tettix granulata, *Kirby.* Common.
Tettix triangularis, *Scudder.* Not uncommon.
Tettigidea polymorpha, *Burm.* Very common.
Tettigidea lateralis, *Say.* Very common.

I have taken the four latter species in early spring as soon as the snow was off the ground. With the exception of those marked with an *, the species in the above list were kindly named for me by Mr. Scudder. The Gryllides were also submitted to him, with the exception of *luctuosus* and *domesticus*, but he wrote me that he was unwilling to say what they were until he could take time to study them.

ON THE GEOGRAPHICAL DISTRIBUTION OF NORTH AMERICAN LEPIDOPTERA.

BY AUG. R. GROTE, A. M.

(Continued.)

Again, the genera *Citheronia* and *Eacles* are a South American element in our fauna, while the typical Attacinæ, such as *Actias*, probably belong to the Old World element in our fauna, together with all our *Platypteryginæ*. Among the Hawk Moths the genera *Philampelus* and *Phlegethontius* are of probable South American extraction, though represented now by certain strictly North American species. Mr. Robert Bunker, writing from Rochester, N. Y., records the fact that *Philampelus Pandorus*, going into chrysalis August 1, came out Sept. 10 as a moth, showing that in a warmer climate the species would become double-brooded. And this is undoubtedly the case with many species the farther we go South, where insect activities are not interrupted so long and so strictly by the cold of winter. Since the continuance of the pupal condition is influenced by cold, a diminishing seasonal temperature for ages may have originally affected, if not induced, the transformations of insects as a whole. Butterflies and Moths which are single brooded in the North become double brooded in the South. The winter is the season during which the activities of insects cease and the existence of Lepidoptera becomes artificially lengthened by the intervening of the cold. Premature hibernation is a relic of the time when the winters were longer than at present; this habit is seen in the case of the larvæ of several species of Butterflies, and is otherwise inexplicable. Again, the Notodontid genus *Apatelodes* is of a Southern type of this Sub-family of the Spinners, while *Datana* is descended ultimately from Tertiary Arctic forms. In these two cases the genera have probably gradually become distinct from their allies; nevertheless the relationship to existing genera in South America and Europe may be plainly traced. The foreign elements in our Moth-fauna overlap those which may be considered North American *per se.*

From studies of this nature, here briefly summarized and but partially displayed, the Science of Entomology derives an importance not discernable when it is limited to a mere sorting of species classified after their variety and their value according to the collection. It is part of the task

which the intellect perceives to await accomplishment after a mass of work has been performed in recognising the different kinds. It is hardly advanced by the use of difficult language and the employment of abstruse terms ; for my own part I have always tried to use plain English in the proportion as I seemed really to understand the subject I had in hand, and, without in any way undervaluing the use of proper scientific terms, I think that writings on our Butterflies and Moths are occasionally overloaded with them, to the detriment of the clear understanding of the subject. We are here facing the one simple problem of the ancestry of our present species and in explaining the existence of the different elements in our fauna, and in trying to sort a few of our leading genera, I have aimed at making the subject clear and attractive, if I could, rather than at expressing myself in a simply technical manner. After the first passion for possessing rare or fine specimens has become blunted, the deeper problems connected with these beautiful and interesting insects obtain a hold on the mind, exercising a more controlling fascination as they lead to wider results. I have been especially struck with the fact that so many leading genera, e.g., *Catocala*, do not cross the Equator, being confined to the Northern Hemisphere, as also that there is perhaps, on the whole, between the different faunæ, from East to West, a greater general resemblance than from North to South. The hot central Equatorial Region evidently precludes the passage of certain genera, notwithstanding its fecundity in peculiar forms. And notwithstanding physical barriers, such as oceans and mountains, there seems to have been a transference through changes in climate on isothermal lines around the globe. All these matters are very interesting to speculate upon, and the common mistake of setting up an hypothesis and then treating it five minutes afterwards as a fact as old and well established as the hills, I have myself often, no doubt, fallen into. But I have always relied on my friends to correct my mistakes in print, a matter they have ever promptly attended to, so that, in some sense, I feel quite secure in my statements, which, if they are likely to be true, will be "absorbed," and, if they are not, will be "corrected," myself abused and the public disabused by the operation.

The subject of geographical distribution is, as I have said, best studied in connection with the topography of the country. In this connection the two principal drainages of the country, the Mississippi and its tributaries, and the chain of the Great Lakes and the St. Lawrence, must be taken into consideration. Valleys and water courses have attracted and furthered

the propagation of animals, and assisted the development of the civilization of man. In America we have evidence of the former existence of human societies along the Ohio River, and to whatever branch of historical studies we may betake ourselves, the topography of the country must supply the foundations and become fixed in our minds. It is the scaffolding upon which is displayed the picture of animated Nature. After the physical features, the prevailing winds, the amount of rainfall, the *average* warmth must be observed. Early in my studies I became interested in the migrations of the Lepidoptera in North America. A yearly zoological wave sets in from the tropics and carries upon its crest numbers of light-winged Moths, which eventually range up our entire coast, and are found in Maine in the autumn. The summer, that pulse of the year, the length of whose recurring beat is at once the measure of the time elapsed since the culmination of the last ice period, gives us a prevailing northward direction for the winds that sweep the North American continent. They offer aerial paths along which numbers of feathery winged moths are hurried. They distinctly aid the dispersal of the Cotton Moth, for instance, and on the coast of Georgia it comes earlier or later as the south wind has blown fitfully or steadily. We have wind visitors on our shores during the whole season, some of which become citizens for a time by breeding intermittently within our territory.

All natural barriers succeed to some extent in producing more or less local variation in flora and fauna, and local variation ends, in connection with the climate, in producing distinct species. The species of moths inhabiting islands, or confined between mountain chains, often show distinctive features in color, size and markings. From what I have seen I think that *Thyatira Pudens*,* found on Anticosti, has become grayer, the pink spots less vivid than on the main land; the darkening by mixing of color, noticeable in Polar species, has here taken place. Many other instances occur to me in writing, but it is sufficient here to refer to local variation as affording an interesting part of the study of *Lepidoptera*. After a certain phase of variation has been attained it seems probable that interbreeding stops, and that, were the original form introduced, it would continue breeding side by side and without intermingling with the

* This variety is worthy of a distinct name, and in my second Check List of N. Am. Noct. (MSS.) I have called it *Anticostiensis*. The moth is grayer, more hoary, the pink color has faded. Mr. Wm. Couper has taken this form on the island.

local form, until finally succumbing to the same influences. A good deal of what we are now warranted in assuming, is merely reasonable conjecture in default of experiment, but more and more facts are becoming known, all tending to throw light on the origin of species, and in this progress the study of Butterflies and Moths has proved of the greatest assistance to naturalists and philosophers.

As a special illustration of the study of the probable origin of our North Ame[illegible] fauna I may attempt a brief discussion of the genera of our Haw[illegible]s, and present some tables of the different categories. We have seen that there are three proximate sources for our fauna. 1, Descenda[illegible]ts of an Arctic Tertiary fauna. This fauna was forced southward and apart by the last Glacial Epoch, the species descending into Central Asia, Southern Europe, and the American tropical and subtropical region. This category includes species now identical in Europe and America, and which have not been introduced by commerce in historical times, while these latter form a distinct sub-category. 2, Descendants of the North American Tertiary fauna, the members of which latter occupied about the same limits that their descendants do to-day, probably they ranged further to the North. 3, Descendants of an immigration from the South. This stream is still of yearly occurrence. A colony, as we have seen, has been planted in South Florida from the West Indies and South America. Probably also, on the decline of the Ice Period, certain species of South American origin settled permanently and became modified by their residence in the regained territory. This category includes forms permanently domiciled and also such as visit us merely during the summer and do not survive the winter. As belonging to the first category in the Sphingidæ we have the genus *Hemaris*, which in Europe has only two species, but with us from 12 to 15. (The series *Tenuis*, *Diffinis*, *Marginalis* and *Axillaris*, ranging from Canada to Texas, have probably the same origin as the European *Fuciformis*. And we have a distinct sub-genus, *Haemorrhagia*, which contains at least two distinct species, *Thysbe* and *Fuscicaudis*. If we are to believe Mr. Hulst, *Uniformis* is a dimorphic form of *Thysbe*, differing, as I pointed out, by the evenness of the inner edge of the terminal band of primaries. Now the typical series of four species of *Hemaris*, above mentioned, differ from each other in much the same way. In *Tenuis* the band is narrowest, tapering to anal angle, being *even* inwardly and the usual red apical spot wanting, or at

best only the faintest indication. In *Diffinis* the spot is distinct and the inner edge is very slightly *uneven.* In *Marginalis* the inner edge is regularly dentate on the interspaces. In *Axillaris* the dentations are irregular, some very deep and long, while the red spot has become almost a band, extending over the inferior interspaces. In *Haemorrhagia* the body proportions are slightly modified and the band is all claret red. In *Thysbe* the inner edge of the band is dentate. In *Uniformis* it is even. I have described and figured both sexes of *Buffaloensis*, a small form agreeing with *Uniformis* by the evenness of the band, while the [illegible] so filled in as to obscure the bar inferiorly. Now if *Buffaloensis* is only a starved or small *Uniformis*, why do we not find starved or small *Thysbe* with the band dentate? Similarly if *Floridensis* is a stuffed or large *Uniformis*, why is the shape of the band itself modified? Clearly we do not as yet know everything about these insects. We must experiment and breed them, without prejudice or desire to make more or less species than there really are. Mr. Lintner has, I believe, described the larva of *Buffaloensis.* We must not expect very great differences in the larvæ of these forms, but if they differ from each other and breed true, then they are good species. Mr. Hulst says *Thysbe* does not breed true, but occasionally produces *Uniformis*, and this we must accordingly accept. But it is not shown that *Buffaloensis* or *Floridensis* are so produced, or that Mr. Hulst knows these forms. I would recommend him to read and study our original papers and figures, which, of *Buffaloensis*, are very excellent, but, if I recollect right, the artist made a mistake in color in the abdomen of *Floridensis.*) Our next genus to *Hemaris* falls into our third category. The species of *Aellopos* are of South American origin. Our next Eastern genus, *Lepisesia*, is probably of North American origin and falls into the second category, but as to this I need further studies of the allied European *Pterogon Œnotheræ.* But the following genera are decidedly North American in their origin, *Amphion*, *Thyreus* and *Deidamia*, while *Enyo* is again South American. The two Californian genera, *Euproserpinus* and *Arctonotus*, are, the first allied to the European *Macroglossum Stellatarum*, while the second is *sui generis* and decidedly American. There remains, in this sub-family, the genus *Cautethia* to examine. This is undoubtedly South or Central American in its origin. The moth *Cautethia Grotei* is found in Florida and also in Cuba; thus it is a member of the Florida colony of which I have spoken, while the two other species, *Noc-*

tuiformis and *Spuria*, are found in Saint Domingo and Mexico respectively Dr. Herrich-Schaeffer mistakenly identifies the Cuban species *Grotei* of Mr. Edwards, with Walker's *Noctuiformis*, and in my papers on the Cuban Hawk Moths I followed him. In the second sub-family, the *Chœrocampini*, we have the genus *Deilephila* decidedly belonging to our first category. Here the position of *Hemaris* is reversed. We have but two species of *Deilephila* in America, representing the *Galii* and *Livornica* of Europe; while, in Europe, a number of species have descended from the common Tertiary progenitor of both the American and European forms. The remaining genera, except *Everyx*, are decidedly South American in character. Our two more Northern common forms of *Philampelus* have long been settled in our territory. *Pachylia* and *Argens* are South American, even as to species, the latter being a summer bird of passage. In the *Smerinthini* we have, as a whole, descendants from an Arctic Tertiary fauna, but certain of the forms probably are strictly belonging to our second category, such as *Cressonia* and *Paonias*. *Smerinthus* proper is only Californian, and *Calasymbolus* has probably an Asiatic species, *Kindermanii*, which I have never seen. *Triptogon* is decidedly a descendant of an Arctic Tertiary genus, which in Asia is represented by many species. The fourth group of the *Sphingidæ* is not represented in North America. *Acherontia* is probably descended from Tertiary Old World ancestors which equally probably never occurred in North America. The fifth group, the *Sphingini*, is interesting from the mixture of genera of different origin. While the *Smerinthini* do not seem to cross the Equator, in the New World at least, the *Sphinginæ* are widely spread, so that their origin is an interesting study. The forms of purely North American descent and belonging to our second category, are *Ceratomia*, *Dolba*, *Ellema* and *Exedrium*, genera with single peculiar species, if we except *Ellema*, which, with its unspotted abdomen, contains three doubtfully distinct species and is not unlikely derived from *Hyloicus*. I cannot believe we have to do with an aberrant Smerinthoid form, notwithstanding what Prof. Fernald seems to think about it. The genus *Sphinx* deserves careful study. It seems to me that the European *Sphinx ligustri* is a true *Sphinx*, and in this regard our species depart a little from the type and are numerous, while in Europe there is only one, the European *Convolvuli* being, in my opinion, referable to *Phlegethontius*. But this latter genus is decidedly South American in its character, and to

this category I would refer the remaining genera, *Diludia*, *Amphonyx* (a Florida colonist) and *Dilophonota*, while *Hyloicus* belongs to the first category. *Daremma*, with its three species, *Undulosa*, *Catalpæ* and *Hagenii*, may be rather strictly North American. Its nearest ally is the tropical *Syzygia Afflicta* (Cuba) and *Pamphilius* (Surinam). The rough, mixed gray, sometimes greenish, stout *Sphingidæ* belonging to the genera *Diludia*, *Syzygia* and *Daremma* (as also *Macrosila tetrio*) are South American and tropical in their general character. They approach *Phlegethontius* in structure and ornamentation, and the series culminates in the gigantic species belonging to Poey's very distinct genus, *Amphonyx*.

When we study the Canadian fauna we see that the South American forms tend to become rarer and drop out, whereas the forms of European affinity and strictly North American in character, persist. The condition of our present knowledge warrants the hope that we shall before long attain complete information as to the range of our Hawk Moths, and, by the aid of strict, unprejudiced studies of their structure, comparative with the South American and European forms, arrive at nearly exact conclusions as to the origin and progress of this most interesting family of Moths.

The conclusions, though entirely preliminary and tentative, which I have reached, as above, concerning our *Sphingidæ*, and which in detail I am willing to correct from further evidence, show us at least how deep-reaching the study of the origin of our fauna is, and what vast questions attend the subject of Geographical Distribution. It cannot be doubted that the study of our fauna, pursued in this way, gains in importance. The small links in the chain of eternal causation must be delicately handled and much must remain a matter of opinion, but always of *intelligent* opinion. Dogmatism is ridiculously out of place in all scientific studies, and nowhere is it more absurdly useless than in dealing with Butterflies and Moths, these frail structures which have hardly left an impression behind for all the æons they have flitted about this globe. Sipping the honey from the flower-cups, they have found their sudden grave most often in the stomach of some insectivorous vertebrate, and this may in one way account for the few fossils we find of them. But a variety of causes contribute to this result, and the imperfection of the geological or palaeontological record with regard to the Lepidoptera, entirely prevents our making tables of descent, such as have been prepared for so many of

the vertebrates by modern science. We are thrown for our surmises upon the structure of existing forms, and this very alluring study I have endeavored to give a sketch of in the present chapter. I repeat what I have often said, that only by such views of the Lepidoptera, such higher uses to which we may put our knowledge and observations, do we relieve the study from the charge of triviality, a mere sorting and arranging of objects which is pursued by some even to the elimination of æsthetic amusement and pleasure, and degenerates into a mere storing up of specimens rare and difficult to obtain, and panders to the strictly selfish passions of the human heart.

(To be Continued.)

NOTE ON AGROTIS HOSPITALIS.

BY A. R. GROTE.

Having recently, through the kindness of Mr. W. W. Hill, the well known Lepidopterist, been able to carefully compare my type of *hospitalis* with a series of *Agrotis perconflua* Gr., I believe we have to do with a variety of this latter species differing by the black marked t. a. line, the black edging on costal region of t. p. line, the more suffused and deeper color. The insects are structurally identical, and although variation in these points is not usual (I have not met with it), yet the perfect correspondences in other points carry the conviction that in *hospitalis* from Lewis Co., N. Y., we have only a form of *perconflua*. These more northern forms of the genus, viz., *Hilliana*, *conflua*, *perconflua*, and *rubifera*, are related to our common New York species, *A. Phyllophora*, and the Californian *A. Rosaria*, as well as to several European species of the genus *Agrotis*.

The Canadian Entomologist.

VOL. XVIII. LONDON, DECEMBER, 1886. No. 12

ON A NEW LIBRARY PEST.*

BY DR. H. A. HAGEN.

Everybody now-a-days has books, even if he never reads them. It has become an acknowledged fashion—the more books the larger the wisdom, the finer the culture. The climax is reached in France, where you can buy as decoration for fine rooms large libraries, where all the prominent classic authors are represented only by the handsomely lettered backs of the volumes, stored in cabinets with glass doors. The key of the cabinets is invariably mislaid; in fact, the cabinets do not open at all. But even where book-cases contain real volumes, it is interesting to observe which authors are never taken out. In German private libraries, the binding of Klopstok's masterpiece, the Messiah, is almost invariably as fresh as possible, and in England and here I have often seen Paradise Lost in a very fine condition. As an instance of the contrary, when I was a young man, an older prominent naturalist singled out a volume from my library in a condition best to be described by book and binding in tatters, and then exclaimed, "That is just how I like to see books." It was on bugs, and my scientific digestive organs were at that time in excellent condition. Later I was always interested in picking out books in similar condition in libraries, in order to have an idea of the taste and favorite studies of the patrons. I should state that the first prize could be given to a copy of Pepy's Memoirs, in the truest Billingsgate condition, greasy as candles. It was in a library intended for the culture of the young.

Let that be as it is; but certainly no owner of books likes to have his property destroyed except by himself. I had believed until recently that the most obnoxious enemies of books were my special friends, the insects. But I see now that I was decidedly wrong. A most interesting publication, "The Enemies of Books," by William Blades, in London, which

* Read before the Boston Thursday Club, January, 1886.

has gone through three editions during the past five years, shows conclusively that men are far greater enemies of books, at least in old England. Mr. Blades describes everything injuring books—fire, water, gas, heat, dust, neglect, and ignorance. Then come two short chapters on the book worm and other vermin, followed by chapters on bookbinders and collectors. The small volume contains facts which will be read with virtuous astonishment and disgust. A rich shoemaker, John Bagford, one of the founders of the Antiquarian Society, in the beginning of the last century, went from library to library, tearing away title pages from rare books of all sizes. These he sorted out according to nationalities and towns, and so formed over a hundred folio volumes now preserved in the British Museum. Others collect initials on vellum, all rich in gold and colors, floral decorations ranging from the 12th to the 15th century, all nicely mounted on stout cardboard. A Mr. Proeme collects only title pages, to follow a senseless kind of classification. One of his volumes contains coarse or quaint titles, showing how idiotic or conceited some authors have been: "Bowels Opened in Diverse Sermons," "Die and be Damned," and many others too coarse to be quoted. Certainly it is sure that the poor bugs cannot compete with such rivals, except some more enterprising ones, apparently bound west, and going straight through 80 folios of patristic works, making them look like a spy-glass, in a fashion never dreamed of by Chrysostomus and his partners.

Nearly six years ago I was invited to make a communication about library pests, at the meeting of the librarians in Boston. After a review of the literature then at my command, I came to the conclusion that only two insects were to be considered very dangerous and obnoxious in North America, the Anobium and the White Ants. The Anobium is a small beetle, which is also very destructive to old furniture and old picture-frames. All who have the infirmity to indulge in the love for old furniture, will have often observed with disgust small round openings in their treasures, out of which a fine mealy dust falls in little heaps on the floor. I observed myself such a case long ago, when I was a boy, but I confess that the remembrance of this case is always accompanied by a strong itching of my right ear. A lady cousin of mine who was a lover and lucky owner of such old jewels, had decided to take care of them herself. I had been naughty enough to write the date in these dust heaps with my fingers. When I impudently ventured to show to her about a fortnight

later the date I had written still undisturbed, the only acknowledgment of my service came forth with admirable dexterity.

Use every man after his desert, and who should 'scape whipping?

Nevertheless I gave up forever this kind of chronological record.

Three additions to my communication before the librarians have been published, but they contain only isolated cases, certainly nothing of general importance. Of course the insects mentioned had injured books, and as everybody likes to have his own little pest, the new comers were chronicled with some emphasis. Nevertheless I have followed up the matter carefully during these six years, and would be able to give a nice list of names of more or less queer composition. Six years ago a part of the publications on book pests was not to be found here. But in the meantime I have been able to get some of them, the most important ones through the splendid custom of the public library of ordering books wanted by scientists for their study.

There is, in fact, no end of obnoxious creatures. "Misery acquaints a man with strange bedfellows." Perhaps the word obnoxious is not exactly in the right place, as probably those bedfellows may consider the intruding stranger decidedly obnoxious. Nevertheless, as such philosophical views would destroy every legitimate Museum's business, we are bound to our accustomed impoliteness towards all intruders.

One morning Mr. R. T. Jackson, assistant in Geology in the Museum, asked my advice and help against a new pest in his department. The stones and petrefacts were left untouched, but all the new labels, written during the past year, were more or less injured, or nearly destroyed. Of course this is a serious danger for a collection, as the specimens lose their value if the locality or the scientific name is lost. A new form of labels had been chosen last year printed on excellent card paper. The stones are kept in small square open boxes, the label is folded in the middle; upon the lower half the stone is laid, to keep the label in place; upon the upturned half the locality and the name are written in order to afford an easy view of the contents of the collection. Now, since last winter this upper half has appeared to be scraped on both sides in such a manner that the writing is injured and in some cases has disappeared. The lower half of the label was similarly injured, so far as not covered by the stone; the under side of the lower half proved never to be injured, and was apparently protected by the bottom of the box, to which it was pressed

by the weight of the stone. The damage is a considerable one, as the whole collection is again to be provided with new labels. A careful research led to the discovery of an insect belonging to the genus Lepisma, which lived in the boxes and cabinets. The old labels of common writing paper were never attacked, therefore it was to be presumed that the finish of the new labels was the attraction to the insects. Indeed, Professor C. L. Jackson found the new labels finished on both sides with starch, and without doubt the starch covering attracted the Lepisma. I was rather puzzled by this fact. It has been known for more than a century that the greatest library pest, Anobium, does not like starch. Therefore it was recommended to use in binding books only such paste as was made of pure starch without meal, of course also with the addition of several drugs of the most vicious odor; and now a new customer proves to prefer starch to other things. It is, by the way, a queer but very common association of ideas that substances with an unpleasant scent to man should also be unpleasant to insects. But the virtuous hater of Rockfort or Limbourg cheese would directly be disabused by discovering with a common hand lens a lively carnival of bugs in those disgusting dainties.

The Lepisma destructive to the labels is a true American insect, described by Professor Packard as *L. domestica*. It belongs to a small group of insects with the euphonious name Thysanoura, and there are half a dozen species known in the United States. The principal one found in Europe is the *L. saccharina*, better known as the Small Blue Silver-fish. This little insect is found in dark places or corners near provisions, running very fast, and being so soft that it is crushed by the lightest touch. In Europe it has always been considered, but without proof, as imported from America. It has been known there for more than 200 years, but its existence cannot be traced before the discovery of America. The whole body of the insect is covered with very fine iridescent scales, which have been used as a delicate test object for microscopes, and are the cause of its vulgar name, Silver-fish.

The earliest notice of the small European species is in R. Hooke's Micrographia, a folio, London, 1665. It was printed at the expense of the Royal Society, and is an account of innumerable things examined by the microscope. The book is still respected for the accuracy of the author's observations. Mr. Blades calls it most amazing for its equally frequent blunders. I have reason to suppose that the absurd blundering

is more on Mr. Blades' side. R. Hooke calls it Book-worm, and states that it corrodes and eats holes through the leaves and covers of books. The figure is for the time tolerably good and recognizable. On Mr. Hooke's authority, Lepisma was reported as obnoxious to books. As Mr. Hooke has apparently mixed up the destructions done by Anobium with those of Lepisma, of which in the following hundred years no damages were observed, the whole observation was doubted, and Prof. Herman, in Strasbourg, in his prize essay on library pests, declared (1774) that Lepisma was erroneously recorded as obnoxious. This was the reason that I did not mention Lepisma in my communication to the librarians, the more so as in the past hundred years no new observations had again been recorded. I did not mention other remarkable facts, as the Jehthio-Bibliophage, a codfish which had swallowed three Puritanical treatises of John Frith, the Protestant martyr. No wonder, after such a meal, the fish was soon caught and became famous in the annals of literature. This is the title of a little book issued upon the occasion: "Vox Piscis, or the Book-fish, containing three treatises which were found in the belly of a Codfish in Cambridge Market, one midsummer eve, 1626;" great was the consternation at Cambridge upon the publication of this work.

Nevertheless, just after the delivery of my communication, new proofs of the depravity of Lepisma came forward.

"God made him, and therefore let him pass for a man."

Prof. Westwood, of Oxford, showed to the Naturalists' Association in 1879, a framed and glazed print of which the plain paper was eaten by Lepisma, while the parts covered by the printing ink were untouched. I accept this as a sufficient proof of obnoxiousness, the more so as the white paper is often the best part of a print. Prof. Westwood mentioned that the same fact had been observed in India, where some of the Government records had been injured in the same manner.

Patrick Brown states in his Natural History of Jamaica, that *Lepisma saccharina* is very common there, and extremely destructive to books and all manner of woolen clothing. This notice had been reproduced by Linnæus, but was later considered as not reliable.

Mr. De Rossi writes in 1882 as follows: *Lepisma saccharina* likes damp places and destroys in my house paper hangings from inwards entirely. Muslin curtains were perforated and the living animals found near fresh holes. Probably the curtains were starched, though it is not

stated. Also, insect boxes and the wings of butterflies have been damaged.

Prof. Liversidge, in Sidney, reports the same year *L. saccharina* as very common in New South Wales. It does not do so much harm to books, as it cannot well get in between the closely pressed leaves of a book, but it injures loose papers, maps and labels; the loose edges of piles or bundles of letters suffer more than the central portion. Writing paper, too, probably contains more attractive matter in the way of size. The labels were written only 15 months ago, and some hundreds have been rendered totally worthless.

The same calamity is reported by Mr. H. Lucas, assistant in the Museum of the Jardin des Plantes, in Paris. *L. saccharina* destroys labels of white paper, but the parts printed with oil and minium remain untouched. The labels on starched paper were very much injured, but only the white parts. When leaving for the country in 1862, he put in a drawer various articles of clothing, all starched, collars, cuffs and bonnets, and returning after six weeks, he found numerous holes, round or oval, in a bonnet, and Lepisma near by. On the labels of Polyps, Madrepores and others in the Museum, the writing was in a great part destroyed. Dr. Aube, in Paris, says that the black part of the backs of bound books was nearly destroyed, probably by Lepisma.

Mr. Samuel Henshaw, Assistant of the Society of Nat. Hist. in Boston, enclosed purposely living Lepisma with soft paper, part of a newspaper, in a glass jar, and ascertained that the insects had eaten large holes in the paper.

The well-known antiquary, Mr. Quaritch, in London, had complained, 1870, of the ravages done to books; and Mr. Lewis, in London, after careful examination, stated that by eating parts of the bindings the books were caused to fall to pieces; yet he considered it impossible for Lepisma to bore holes in the books, which were probably made by Anobium. Prof. Packard, in his Guide, reports of silk and silken tapestry eaten by Lepisma, which also devour the paste, making holes in the leaves of books. Also, Mr. Horne, in London, alluded to the damages done to silk garments in India by Lepisma. The insect evidently attacks the silk on account of the stiffening matter in it, but nevertheless makes holes in the fabric. Finally, Mr. Adkin showed a species of Lepisma which damaged account books kept in the iron safe of an office in London.

After all these reliable facts, there is of course no doubt that Lepisma,

when left undisturbed, may become very obnoxious. The question, Why has that not been observed long ago? may be answered by the well known "I awoke one morning and found myself famous!" I think there is a very simple explanation. There are so many rogues who work in the same way, that the swiftest one to disappear is often easily overlooked. Many times I have been told by ladies that their silk dresses, always black ones, had been destroyed by carpet bugs, and have always answered that the carpet bugs only attack wool. Indeed, I confess that I have only recently learned that these aristocratic desires belong to the Silver-fish.

If we tabulate all the facts, we find directly that all damages, except those to paper and its combinations, have been inflicted on silks, clothing and muslin curtains which were invariably starched or finished with some stiffening size, making them more easily eaten or eroded. Secondly, the backs of books have been more or less seriously injured. But just here paste had been used in quantity. The gold lettering of the backs is commonly done by putting the gold on paste and burning the hot brass letters into the back. I have been assured that in one case only the gold of the lettering had disappeared. There is no wonder that silken and paper tapestry has been eaten; but it is to be hoped that the industry now common of making paper hangings solely of arsenic may induce Lepisma to emigrate to more hospitable quarters.

That labels in collections have been destroyed, is observed here, in France and in N. S. Wales. All those labels were starched. Prints have been destroyed in England; letters, when lying loose or in heaps, and government records in England, in N. South Wales and in Boston. I think many gentlemen present will find the most rascally instance of destruction is the making erasures in account books in the safe.

After all these facts, there is no doubt that maps, engravings, collections of photographs, herbariums, even label catalogues, are in evident danger. But if we look more closely at the injuries reported, we find directly that all such papers, when pressed firmly together, were not reached by Lepisma, and in this way a large number of accidents may be avoided. Engravings and maps, which would suffer if pressed too hard, will be perfectly safe in simple pasteboard boxes, provided that they are made to close perfectly, so that it is impossible for Lepisma to find an entrance. Insect powder sprinkled in the nooks and corners where Lepisma is often observed—in Cambridge, behind the kitchen stove or

range—kills directly all reached by the powder, and I should recommend the same for silk dresses or the closets and drawers in which they are stored. Concerning valuable engravings, I would cover the backs of those framed with common paper fastened on with a paste mixed with insect powder or tincture. I consider, therefore, Lepisma as not dangerous *when proper care is taken to prevent the danger.*

The most dangerous enemies to papers and books are the white ants, the Termites, because they destroy everything and avoid the daylight, when they work. As I had before this the pleasure of delivering a communication on this subject, I will give only some additional facts which have come to my knowledge during late years. The common white ants of the United States are to be found everywhere, from Manitoba down to the Gulf of Mexico, and from the Atlantic to the Pacific. In the mountains in Colorado, Washington Terr. and Nevada, they ascend to 5000, and even above 7000 feet. It is of course not possible to exterminate them, but they must behave if they intend to live together with man. Their depredations should not exceed certain limits allowed to them. Everybody is accustomed not to forget for one moment the precautions necessary to protect his property against destruction by fire, and if the same precautions were taken and not for one moment forgotten, against the destruction by white ants, I think all that men are able to do would have been done. Of course, very valuable property we are accustomed to shield by fire-proof buildings, and similar caution will be necessary to protect very valuable property, i. e., libraries, against white ants. Buildings should be stone or brick, and all stumps or roots of trees taken out of the bottom of the cellars to a depth of six feet before the cellar floor is carefully cemented. Outside the building should be surrounded by a deep open area; no flower beds, shrubs, ivy, as the necessary manure is the greatest attraction for white ants.

Large cities are certainly in less danger, at least some parts of them. I am sure that all that is called Back-bay in Boston, will be free from white ants, if they are not brought in by nice parks and similar fineries. The older parts of Boston are by no means free from the pest, but for palpable reasons the owners of infected property do not like to speak of such things. Their presence in the State House, in the so-called Dungeon, was noted in the papers four years ago. As nothing has been done to prevent the pest from entering other parts of the building, it is very pro-

bable that they have spread further. The note in the newspapers about the sudden break down of the wooden stand supporting the ensigns and standards, looks very suspicious. Perhaps white ants may know more about it. In the Dungeon only the taxation papers of the State were stored, and the white ants, when I saw it, had arrived at the twentieth year of this century. According to another notice in a newspaper (I cannot say if it is true), the archives of the Board of Health have been placed in the Dungeon—as the notice stated—for preservation. As the State House was built on a place that was formerly a beautiful garden, it is very possible that stumps not taken out may be the cause of the presence of the pest. To find out where the white ants came into the Dungeon, and to follow their gangs outside the building, would be the first and most important step to take. Indeed, two years ago a bill asking for a paltry sum for this purpose was brought before the Legislature, but laid upon the table. In a boarding house in France, infested by white ants, the floor of the dining room suddenly came down two flights, together with the table boarders. It is gratifying to learn that nobody was hurt, and as it is stated, they lost only their appetites for one day. So we may hope that if the Legislature should come down in a similar soft manner, they may lose only their appetites for one day, and that this *argumentum a posteriori* may be followed by an enlightenment about the pest. Indeed, the State House is not the only place infested by white ants in those parts of the city. A few months ago an old bachelor, in a house very near Mt. Vernon Street, had to take out all the injured lumber supporting the walls and to replace it by new. When told by one relation that it was rather dangerous, he answered that he felt very comfortable, as it was only every ten years he had to meet this expense. In the neighborhood of the State House, in small courts, are some sickly looking old trees, probably dear old pets of the owners. They have decidedly the appearance of knowing something about white ants. That may be as it is, but I believe that no library here is more in danger than that in the State House, and I am told that it contains very rare books, difficult or impossible to be replaced. The Athenæum, situated near the State House and on one side bordering on an old churchyard, seems at first in a rather dangerous situation. But the very substantial building, with high, and, I believe, vaulted basements, makes danger to the library appear very improbable. Nevertheless, it would be reasonable to always have the pest in mind, and to

often make a revision of those parts of the library which are little or rarely used. The Public Library does not seem in danger, but I know the surroundings only imperfectly. After all these gloomy predictions, I may assert that nobody would be happier than I if they were forever unfounded, and the librarian might say, What's Hecuba to him, or he to Hecuba!

ON THE GEOGRAPHICAL DISTRIBUTION OF NORTH AMERICAN LEPIDOPTERA.

BY AUG. R. GROTE, A. M.

(Concluded.)

The following tables contain a partial resumé of the species common to Europe and North America, and also of what are technically known as representative species. I have intended to include only species which I have myself examined and which are with some certainty accurately compared. But the term "representative" species is in itself perfectly elastic, as I have elsewhere shown; in the present case the species compared are believed to have had a common ancestor in the Tertiary. With regard to the introduced species no historical data are accessible to me, and I doubt if any exist; it is a case for the operation of reasonable surmise. I think these tables are of preliminary interest and value; I first commenced to publish similar observations in the Bulletin of the Buffalo Society of Natural Sciences. In a comparison of European and American species we are chiefly indebted to M. Guenеè and Dr. Speyer.

FIRST CATEGORY OF ORIGIN OF THE NORTH AMERICAN FAUNA.

I. Species of Moths Common to North America and Europe, probably not Introduced by Commerce, and thus Unchanged Descendants of a Tertiary Fauna.

Europe.	*N. America.*
Euprepia caja (*Linn.*)	*Grote*, Check List, p. 15.
Agrotis C-nigrum (*Linn.*)	*Guenеè*, Noct. I., 328.
plecta (*Linn.*)	*Guenеè*, Noct. I., 326.
fennica (*Tausch.*)	*Guenеè*, Noct. I., 270.

Agrotis conflua *Treits.*	*Grote*, 6th Ann. Rep. Peab. Ac. Sci., 29.
saucia *Hübn.*	Agrotis inermis *Harris.*
ypsilon (*Hufn.*)	Agrotis telifera *Harris.*
Eurois occulta *Hübn.*	*Grote*, Can. Ent., vi., 13.
prasina (*Fabr.*)	*Guenеè*, Noct., II., 5.
Mamestra trifolii (*Rott.*)	*Speyer*, St. Ent. Zeit., 137.
Dipterygia pinastri (*Linn.*)	*Grote*, Proc. Ent. Soc. Phil., I., 218.
Euplexia lucipara (*Linn.*)	*Guenеè*, Noct. II., 65.
Apamea nictitans (*Bkh.*)	*Guenеè*, Noct. I., 126.
Heliophila pallens (*Linn.*)	*Guenеè*, Noct. I., 95.
Pyrophila tragopogonis (*Linn.*)	*Bethune*, Can. Ent., II., 73.
Xanthia togata (*Esper.*)	*Walker*, C. B. M. Noct., 461.
Scoliopteryx libatrix (*Linn.*)	*Walker*, C. B. M. Noct., 1011.
(?) Heliothis armiger *Hubn.**	*Grote*, in Proc. Ent. S. Phil.
Anarta melanopa *Thunb.*	Anarta nigrolunata *Pack.*
myrtilli (*Linn.*)	acadiensis *Beth.*
cordigera (*Thunb.*)	luteola *G. & R.*
Orgyia antiqua (*Linn.*)	Orgyia badia *Hy. Edw.*, Papilio, iii. 39.
Prionia lacertinaria (*Linn.*)	Prionia bilineata *Pack.*
Ennomos alniaria (*Linn.*)	Ennomos magnaria *Guen.*
Metrocampa margaritata (*Linn.*)	Metrocampa perlata *Guen.*
Boarmia crepuscularia (*Treits.*)	Boarmia occiduaria *Guen.*
Asopia costalis *Fabr.*	*Grote*, in U. S. Geol. Reports.
Scoparia centuriella *W. V.*	*Grote*, Check List, 52.
Botis octomaculata (*L.*)	Botis glomeralis *Walk.*
Nomophila noctuella *W. V.*	*Grote*, Check List, 53.
Salebria fusca *Haw.*	*Grote*, in U. S. Geol. Survey.
Pyrrhia umbra *Hufn.*†	Pyrrhia exprimens *Walk.*

* Of this species I have described the large, pale greenish form, apparently not found in Europe, as *H. Umbrosus;* the dirty ochrey typical form is apparently common to both hemispheres. But the species of *Heliothis* may have been introduced by commerce, and I do not refer to them here any further on this account.

† This species (= *marginata* Fabr.) is the same apparently on both continents, but some authors erroneously regard *angulata* as a form of it. Now the varieties of a species seem always to follow the type form, and as *angulata* does not occur in Europe, it is not likely that it is a variety of *umbra*. I have figured both forms in the Buffalo Bulletin, while Dr. Speyer has been at some pains to point out the differences between

II. Species of Moths Common to Europe and North America, probably Introduced by Commerce.

Europe.	*N. America.*
Trochilium apiforme (*L.*)	*Grote*, Check List, 11.
Sesia tipuliformis (*L.*)	*Harris*, Ins. Inj. Veg., 234.
asiliformis (*Rott.*)	*Grote*, Check List, 12.
Heliothis dipsaceus (*Linn.*)*	Heliothis phlogophagus *G. & R.*
var. maritima *Grasl.*	*var.* luteitinctus *Gr.*
scutosus *W. V.*	nuchalis *Gr.*
Plusia ni *Hubn.*†	Plusia brassicæ *Riley.*
Asopia farinalis (*Linn.*)	The Meal Moth.
Galeria melonella (*Linn.*)	The Bee Moth.
Carpocapsa pomonella (*Linn.*)	The Codling Moth.
Tinea and *Tineola.*	The Clothes and Carpet Moths (three species).
Dakruma convolutella *Hubn.*	Dakruma grossulariæ *Pack.*

the two, although his material from America of *angulata* was incorrectly named for him "*exprimens.*" Surely Dr. Speyer must be good authority that in Europe no variety of *umbra* corresponding to *angulata* exists! That another species of *Pyrrhia* exists in America is proved by *stilla*, which is perfectly and undoubtedly a distinct species from any of the others, and handsomer in colors.

* I incline to believe in the possibility that the species of *Heliothis* and *Pyrrhia umbra* have been imported by commerce; in this case the other two American species of *Pyrrhia* may be held as descended from a common ancestor in the Tertiary. This is at the best conjecture. But I am tolerably confident that our two species, *angulata* and *stilla*, are perfectly valid and distinct.

† This species is regarded as distinct and representative by some writers, but I cannot agree with them; the lateral abdominal tufts are the remarkable specific feature common to both forms; the larva feeds on cabbage, and I think it has been brought over like the Cabbage Butterfly. The Heliothians may have been brought with plants, but I do not feel confident of this with regard to *dipsaceus* and *armiger;* it is more likely, perhaps, with regard to *scutosus*, the larva of which feeds in Europe on *Artemisia campestris.* Probably specimens of the European *Zeuzera Aesculi* have occurred in New York, brought by the importation of trees or in wood, but the species has not spread. The Clear-wings above noted have probably been imported. There is a purposed importation of European insects, with a view to acclimatization, going on, conducted by collectors acting from unscientific motives. Prof. Fernald has given us a very careful paper on *Tinea* and *Tineola.*

*III. Species which have very close Allies, and which have accordingly Undergone a Slight (Specific) Change since the Separation of the European and North American Faunæ in the Tertiary.**

Europe.	*North America.*
Hemaris fuciformis (*L.*)	Hemaris diffinis *Boisd.*
Deilephila galii (*L.*)	Deilephila chamænerii *Harris.*
Habrosyne derasa (*L.*)	Habrosyne scripta *Gosse.*
Triaena Psi (*L.*)	Triaena occidentalis *G. & R.*
Jocheaera alni (*L.*)	Jocheaera funeralis *G. & R.*
Arsilonche albovenosa (*G.*)	Arsilonche Henrici *Grote.*
Agrotis baja (*W. V.*)	Agrotis Normaniana *Grote.*
augur (*Fabr.*)	haruspica *Grote.*
Copimamestra brassicæ (*Linn.*)	Copimamestra occidenta *Grote.*
Dianthoecia cucubali (*Bkh.*)	Dianthoecia bella *Grote.*
Hyppa rectilinea (*Esp.*)	Hyppa xylinoides *Guen.*
Helotropha fibrosa (*Hubn.*)	Helotropha reniformis *Grote.*
Oncocnemis campicola (*Ev.*)	Oncocnemis pernotata *Grote.*
confusa (*Ev.*)	Behrensii *Grote.*
Caradrina lepigone (*Moeschl.*)	Caradrina miranda *Grote.*
Pyrophila pyramidea (*Linn.*)	Pyrophila pyramidoides *Guen*
Orthosia ferruginea (*Esp.*)	Orthosia ferrugineoides *Guen.*
Cosmia paleacea (*Esp.*)†	Cosmia infumata *Grote.*
Lithophane lambda (*Esp.*)	Lithophane Thaxteri *Grote.*
ingrica *G.*†	pexata *Grote.*
Lithomia solidaginis *Hübn.*†	Lithomia germana *Morr.*
Calocampa vetusta (*Hubn.*)†	Calocampa nupera *Lintn.*
Calpe thalictri (*Bkh.*)†	Calpe canadensis *Beth.*
Rivula sericealis (*Scop.*)	Rivula propinqualis *Guen.*
Cidaria populata (*Linn.*)	Cidaria Packardata *Lintn.*
Triphosa dubitata (*Linn.*)	Triphosa indubitata *Grote.*
Glaucopteryx caesiata (*L.*)	Glaucopteryx inventaria *Grote.*

* This category may be in so far almost indefinitely extended since I have shown that *all* grades of similarity exist, from undoubtedly different, but congeneric, to undoubtedly identical species. I have only included forms which run very close, about some of which perhaps naturalists are not clear whether they are the same or different. In the discussion of these it is to be regretted that much unscientific temper has been displayed, but that is the fault of that amateurism which Dr. Packard so deprecates.

† These are probably identical species.

SECOND CATEGORY OF ORIGIN OF THE NORTH AMERICAN FAUNA.

*I. Species which are probably Descended from North American Tertiary Ancestors, Occupying Comparatively the Same Territory.**

Thyreus Abbotii *Swainson.*
Deidamia inscripta *Harris.*
Cressonia juglandis *Abbot & Smith.*
Dolba Hylaeus *Drury.*
Phemonoe quinquecaudata *Ridings.*
Alypia octomaculata *Fabr.*, etc.
Hypoprepia fucosa *Hübner.*
Leucarctia acraea *Drury.*
Packardia fusca *Packard*, etc.
Lacosoma chiridota *Grote.*
Hyparpax aurora *Abbot & Smith.*
Heterocampa Astarte *Doubleday*, etc.
Platysamia cecropia (*Linn.*), etc.
Prionoxystus Robiniæ *Peck.*
Leptina dormitans *Guen.*, etc.
Eutolype Rolandi *Grote.*
Copipanolis cubilis *Grote.*
Harrisimemna trisignata *Walk.*
Arzama obliquata *G. & R.*, etc.
Ufeus satyricus *Grote*, etc.
Marasmalus ventilator *Grote*, etc.

THIRD CATEGORY OF ORIGIN OF THE NORTH AMERICAN FAUNA.

I. Species which have been long Domiciled and probably Originally of South American Origin.†

Philampelus Pandorus *Hübner.*
Citheronia regalis *Fabr.*
Eacles imperialis *Drury.*
Cosmosoma omphale *Hübner.*

* These are mere selections from a host of species which belong by descent to the North American fauna *per se.*

† This list is also extremely partial; at some time in the past there has probably commenced a movement from South to North which resulted in the settlement of the ancestors of these forms within the territory of North America.

Gnophaela vermiculata *Grote.*
Lycomorpha pholus *Drury.*
Ecpantheria Scribonia *Stoll.*
Empretia stimulea *Clem.*
Oiketicus Abbotii *Grote.*
Apatelodes torrefacta *Abbot & Smith.*
Hyperchiria Io *Fabr.*
Scolecocampa Liburna *Geyer.*
Remigia latipes *Guen.*, etc.
Panopoda carneicosta *Guen.*, etc.
Homoptera edusa *Drury*, etc.
Lagoa opercularis *Abbot & Smith*, etc.
Carama cretata *Grote.*
Anticarsia gemmatalis *Hübner.*
Antiblemma canalis *Grote.*
Selenis monotropa *Grote.*
Homopyralis tactus *Grote*, etc.

II. Species which are Partially Domiciled, not probably Continuously Breeding in the Middle States and to the Northward, where they are Winter-killed.

Enyo lugubris *Linn.*
Aellopos Titan *Cramer.*
Dilophonota Ello *Linn.*, etc.
Philampelus Linnei *G. & R.*
Anomis erosa *Hubn.*, etc.
Aletia argillacea *Hubn.*
Euthisanotia timais *Cramer.*
Hyblaea puera *Fabr.*
(?) Hypocala Hillii *Lintner.*
Erebus odora *Linn.*
Plusia egena *Guen.*

III. Species which form part of the West Indian Colony in the Florida Peninsula.

Spragueia pardalis *Grote.*
Cautethia Grotei *Hy. Edwards.*
Amphonyx Antaeus *Drury.*

Pachylia Ficus *Linn.*
Didasys Belæ *Grote.*
Lymire Edwardsii *Grote.*
Eupseudosoma floridum *Grote.*
Euhalisidota longa *Grote.*
Byssodes obrussata *Grote.*
Urapteryx floridata *Grote.*
Mecoceras Peninsularia *Grote.*
Almodes rivularia *Grote.*

These last eight species are presumed to be distinct from closely allied species inhabiting the West Indies. They have been colonized from thence and in part have undergone some local modification which is presumed to have progressed far enough to warrant a distinct title. It is in the same case with the first category; there will probably be found all grades of relationship in these Florida species, and we shall have to express as best we may the *amount* of these differences in our nomenclature. A sufficiently difficult task! And the "lumpers" will have to be fought against until all the life histories are known and have been quietly compared.

IV. Species which are probably mere Summer Birds of Passage from the West Indies and South America, following the Gulf Stream or Aided by Prevailing Winds.

Diludia Brontes *Drury.*
Argeus Labruscæ *Linn.*
Thysania zenobia *Cramer.*
Noctua agrippina *Cramer.*
Brotis vulneraria *Hübner.*
Sylectra Erycata *Cramer.*

These tables will rather show of what material our fauna is made up, what its relationships are, than any attempt to classify with precision a part of our genera and species according to their probable origin and distribution. But very little has been yet published, so that full lists cannot be compiled; the foregoing are mainly drawn up from my own experience and work.

I believe that these conclusions as to the origin of our genera may be properly criticized from a better knowledge of the facts, but I also believe

that these general ideas as to the origin of our fauna will more and more come to be regarded as probably true, and that I have given them a proper scientific basis.

As we go southward, the Canadian fauna gradually absorbs southern elements in its character. Certain genera, which are plentifully represented in the West Indies, appear in single species; as, for instance, the brightly colored, clear spotted, arctic form, *Zygaenidæ*. Occasionally, at least, *Cosmosoma omphale* occurs in New Jersey; it is not rare in South Carolina; I have taken it, flying in the daytime, in Alabama. Again the larger species of *Ceratocampinæ*, such as *Citheronia* and *Sphingicampa*. become more plentiful in individuals in the Middle and Southern States, There is a change in the character of the *Noctuidæ;* certain genera of the *Nonfasciatæ*, such as *Orthosia* and allies, *Lithophane*, etc., gradually disappear, and the genera of the *Fasciatæ*, such as *Homoptera*, *Pleonectyptera*, *Poaphila*, *Remigia*, *Homopyralis*, etc., become more plentiful. Again, as we go westward, the Heliothians appear in more numerous forms of genera and species, and, in Colorado and California, are quite important components of the *Noctuidæ*. But, as a whole, we have a fauna of moths homogenous in general character until, on the Atlantic side, we strike the tropical colony in Florida, and, on the west, we meet the Mexican fauna in Texas and the South-west Territories. Labradorian and Arctic forms we meet again on the summits of the White Mountains in the east, and on the Rocky Mountains and parallel ranges in the west. The local lists which have appeared of late, and the compilation of which is most laudable work for entomologists in all parts of the country, bear out this general view. The replacement and change of species is a very gradual one; striking differences will be called out by the comparison of localities separated by mountain ranges. If the student will bear in mind the different elements which go to make up our fauna, and which are here superficially discussed and indicated, he will arrive at some comprehension of the relationship which our fauna bears to that of Europe, Northern Asia and South America, and, in time, its true distinguishing features can be fully grasped. My own principal satisfaction, during late years, has arisen from a slightly increased apprehension of the importance of the problems of geographical distribution, and how they may have been influenced and brought about. All this will come clearly to light when large collections shall have been brought together from all principal points

within our territory, while the study of the West Indian, Mexican and South American faunæ is one to which the North American student of our moths must sooner or later betake himself, if for no better reason than that it is necessary for a better knowledge of his own particular fauna, which stands in close relationship to these and takes no note of political boundaries. Already I hear of one good student, Mr. Wm. Schaus, working away in Mexico!

Very instructive tables may be prepared of the different expression of European and American genera of moths. We have, for instance, more than double the number of species found in Europe of the genera *Apatela*, *Oncocnemis*, *Catocala*, etc. In fact, going parallel with our larger territory, all the principal genera of Moths represented on either side of the Atlantic contain a larger number of American than of European forms; and this with but few exceptions, such as *Eupethecia*, where the American species are probably but indifferently known. Certain genera, very largely represented in Europe in the Moths just as in the Butterflies, are totally wanting in America, as, for instance, *Zygaena*. I am speaking now of peculiar genera which give a determinative expression to the faunæ, leaving out of sight the innumerable cases of nearly allied genera replacing each other on the two hemispheres. The time for the institution of such comparisons will not fully come until our Western faunæ are well known. So important an European genus as *Hypopta* has only been recently discovered in Arizona, and undoubtedly we have yet much to learn before we really know what forms our territory harbors. Quite unexpectedly Prof. Snow found in New Mexico a species, *Halisidota trigona* Grote, which has an exceedingly close ally in South America, figured by Dr. Herrich-Schaeffer. But what was to me a most surprising fact was the discovery, by Mr. W. W. Hill, of Albany, N. Y., of *Hepialus auratus* Grote in the North Woods. This species belongs to the genus or subgenus *Plusiodes* of Herrich-Schaeffer, and our species has a near ally in Brazil as illustrated by this authority. That such a genus as *Hepialus* should be so widely distributed, considering its life history, structure and habits, is a proof of the great age of this type of the Moths. Other Bombycidæ might easily spread themselves, but the Ghost Moths would seem by their weak structure, somewhat unwieldy flight and nocturnal habit, not to be of this number. *H. auratus* has patches of dead gold scales principally about the cell of primaries at base, while three bright, gilded, tri-

angular, superposed, brown-edged spots form part of the subterminal band opposite the cell. The hind wings are pinkish fuscous ; both wings have the short fringes shaded with orange. Almost all the *Hepialinæ* are thinly scaled, sub-transparent, and the peculiar fact that the secondaries are also 12-veined render them anomalous among Moths. I notice that the Rev. Mr. Cramer records the fact that he captured some twenty specimens of the "Graceful Ghost," *Hepialus gracilis* Grote (the tautology of the English name is better than its equivalence), sitting against the trunks of trees in a cemetery (appropriate spot !) at St. Johns, New Brunswick. I wonder he did not run away from them, with their ill-omened name, conferred, I believe, from the ghostly appearance of the European *Hepialus Humuli* when flying, the male of this species being silvery white above and brownish gray beneath, and, in its vacillating flight, exposing now the white and then the dark surface, presents an uncanny appearance in the dusk of evening. A large species, *Hepialus argenteomaculatus* of Dr. Harris, inhabits the Catskill Mountains, as also various localities in the Eastern States. Dr. Harris originally in his Report describes this species, which has dusky fuscous bands and is of a dull obscure tint, as compared with a second larger silver-spotted species, having a salmon pink tinge and figured by me in the Proceedings of the Philadelphia Entomological Society many years since under the name of *Hepialus quadriguttatus*. The silvery spots are smaller as compared with Dr. Harris' species ; but, strange to say, in Agassiz' "Lake Superior," now a rare book, Harris figures my larger species, which inhabits the Lake Superior Region and Canada, as identical with his *argenteomaculatus*. I have also a suspicion that my *quadriguttatus* has been re-named by Mr. Strecker, but I am not certain of this synonym as I am of so many others which might have been avoided by only a little more care as to what has been published. If students would only study our own periodical literature covering the last twenty years or so before putting pen to paper ! I know of so many instances where this obvious duty has been neglected. And then if they would always have surely the right name of the species they discuss. I have known a great deal of argument wasted on a wrong determination.

In concluding this somewhat discursive, but I hope not on this account less readable paper, I cannot but pay my tribute to the CANADIAN ENTOMOLOGIST and its contributors for important contributions to the development of our knowledge. Speaking with the experience of more than a

quarter of a century of active scientific work behind me, I may be excused if I acknowledge how much I myself, at any rate, have profited by this regularly appearing publication, which, alone by its constancy, gives one courage to persist. A host of facts have been painstakingly recorded in its pages, year by year, and an article on our Insects written without a knowledge of what the CANADIAN ENTOMOLOGIST contains, would be a comparatively valueless contribution. The Canadian Entomologists themselves are a body of careful, if conservative, workers, filled with the proper spirit of devotion to their pursuit, and, above all, courteous and kind as correspondents. I am myself so much indebted to their many favors that what little I have been able to accomplish takes much of its value from their assistance; while the impartial editorship of their journal has led me to entrust my manuscripts freely for publication, thankful for the opportunity of recording my modest discoveries upon its friendly page.

PRESENTATION.

It affords us much pleasure to announce that our esteemed friend and valued contributor, Mr. AUG. R. GROTE—now residing at Bremen in Germany—has been presented by His Highness the Duke of Saxe Coburg-Gotha (brother-in-law of Her Majesty the Queen), with the large Silver Medal, *Princeps Musarum Sacerdos*, for Art and Science. The award was accompanied by a very friendly letter, alluding in warm terms to Mr. Grote's literary and scientific talents, and was entirely unexpected by its recipient. We beg to offer Mr. Grote our hearty congratulations on this pleasing recognition of his work and attainments.

DATES OF PUBLICATION.

The dates of the publication of the numbers of the current volume of the CANADIAN ENTOMOLOGIST from January to August, 1886, were given at the end of the September number, page 180. The remaining numbers were issued as follows :—

September number,		November 25, 1886.
October	"	December 29, "
November	"	January 30, 1887.
December	"	February 19, "

INDEX TO VOLUME XVIII.

The Canadian entomologist