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THE CANADIAN
ENTOMOLOGIST.

VOLUME XVI.

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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 half-way place were a few of these *Lycæna* 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 *Lycæna*. 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 *Daedalus*." 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 *Daedalus*, 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, *Daedalus* 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 *Daedalus* ♂, 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-cerulea*); and in the female the color of *Sæpiolus* is fuscous, with more or less blue at base.

Boisduval describes *Icaroides* as *subviolaceo-cerulea*, the ♀ *fusca*. For *Rufescens* ♂ he says shining blue, *nitide cerulea*. 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*, *Scudleri*, *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 1½ 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, Rhopaloceres 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 America 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 similar 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 *Sphingidae*, 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."

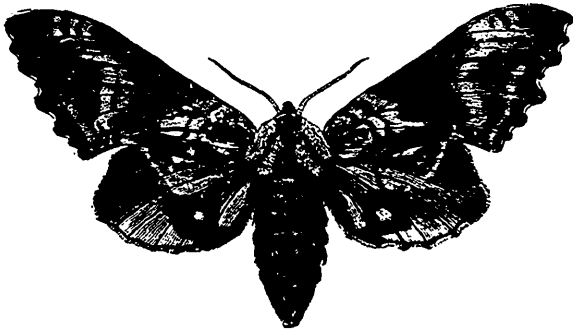


Fig. 1.

The Blind-eyed Sphinx, *Smerinthus excaecatus*, 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.

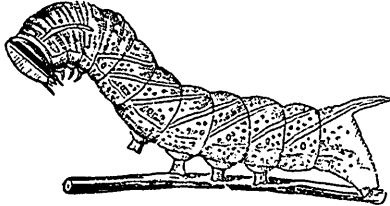


Fig. 2.

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 Purlind 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



Fig. 3.

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.

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 Moulting.—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 Moulting.—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 Moulting.—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 Moulting.—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 pruescence. 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 Catoçala 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 *Iliia* 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 venomous 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 considerably 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, a ♀, 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 *likes* 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 *Telex 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 PÆONIAS (*SMERINTHUS*)
EXCÆCATA.

Last fall (1883) I found the larvæ of a *Sphinx* quite abundant on willow, which were unique 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 linden, 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.

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THE DUNG PELLET MAKERS.

BY FREDERICK CLARKSON, NEW YORK CITY.

The term *Scarabæus*, 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 *Scarabæus*, and the English word *Crab*. Any ordinary scholar can follow the slight linguistic change that produces one from the other. The *Scarabæus* 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 *Scarabæus* 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*. *Scarabæus* 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 Lysioptelidæ, 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, 1883. 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."