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# The Canadian Entomologist.

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## PRACTICAL ENTOMOLOGY.

### “MOSS-HUNTING.”

BY PROFESSOR J. T. BELL, BELLEVILLE, ONT.

Having had several enquiries addressed to me as to how I captured the Pselaphidæ, etc., a list of which appeared in the ENTOMOLOGIST of March, 1881, it has occurred to me that it might be acceptable to some of my entomological brethren to have a detailed account of my method of moss-hunting published in our organ.

First, then, as to gathering the moss. For pedestrian excursions, a game bag, or haversack, to sling over the shoulder, will be most convenient; where a vehicle is employed, a pillow case or grain bag may be used, and in either case a small hand rake about a foot long will be found very useful. As soon as the snow leaves the ground, the collector may seek some open swampy woods, where the ground is varied with little mounds by the decay of fallen trees or the upturned roots of wind-falls, which are overgrown with mixed mosses,—or the banks of a pond or creek, strewn with rotting logs and branches. The moss should be taken up in large flakes, with as little disturbance as possible, and packed tightly in the bag. It is of little use taking the moss which grows in thin sheets on the stumps and trunks of trees, as few insects will be found in it, and there is one sort which grows in compact oval bunches of a bright green, which I uniformly reject as barren. The most productive is that which grows on the ground, and is not less than an inch in length of stem. So long as the ground is clean of snow, a little frost is not objectionable, but rather the reverse, as some of my most successful collecting was done when the moss was pretty well frozen, and the pools were covered with ice strong enough to walk over; but whatever may be the weather, the moss must be damp,—insects will not live in dry moss.

Having brought a cargo home, the next step is to get out its living treasures, for which the following implements will be needed: 1. A sieve,

which can be easily and cheaply made as follows: A light wooden box about 9 in. by 7 in. may be had at any drug store; the bottom is knocked off and replaced with a piece of wire-web of four meshes to the linear inch; the sides must be cut down with a fine saw to a depth of three inches, and strips about  $\frac{1}{2}$  in. wide nailed along the sides beneath the wire to keep it from touching the table. 2. A sable or camel hair pencil of the size known as duck quill, on a wooden handle. 3. A pair of flexible tweezers with fine points. 4. A small palette knife, the use of which is when a small insect is covered up among the dust and debris of the moss, to take up a portion and scatter it on a bare place on the paper, when the beetle will become accessible. 5. A hand or pocket magnifier. 6. Two cyanide bottles, without saw dust. 7. A basket or box to receive the spent moss.

The operator will place the sieve upon a sheet of strong white paper,—cartridge paper is best,—and taking up a moderate handful of moss, tease and shake it well over the wire; he will then lift the sieve, giving a couple of smart taps on the end to dislodge any clinging insect—and look out for the “bugs.” The Carabidæ and Staphylinidæ will first run at racing pace over the paper; the Pselaphidæ and Scydmaenidæ will progress more deliberately, though still pretty rapidly, in a steady, straight-forward march, with their prominent antennæ stretched out before them, while the Trichopterygidæ will circle about, like the Gyrini upon the surface of a still pool, at an astonishing speed for such molecules of beetles. The larger insects may be captured with the fingers or the forceps; the smaller ones by moistening the brush between the lips and touching them with the point, to which they will adhere; the brush with the insect attached is introduced through the neck of the bottle, when a slight fillip with the fingers will dislodge the captive. In the meantime the Curculios, Chrysomelas, Tenebrios, etc., will recover from the shock, and betray their presence in their own slow, deliberate manner, when they too can be secured. Along with the beetles there will be seen numerous spiders, ants, mites, poduras, etc., and now and then a few small Diptera and Hymenoptera.

To display the smaller captured beetles to the best advantage, they should be suffered to remain twenty-four hours in the bottle, when the cyanogen vapor will have caused their limbs to be limber and relaxed. They may then be attached to a strip of card-board by a small portion of mucilage, previously thickened by evaporation till it will not spread out

or sink into the card. A sufficient number of spots of this are placed about a quarter of an inch apart, and on each spot is laid a beetle, back down, care being taken that the head, legs and antennæ are kept from contact with the cement. When the latter has hardened sufficiently to hold the insect in its place, its antennæ, palpi, legs, etc., may be adjusted with a very small, short-haired, red sable pencil, just moistened, enough to make the hairs adhere together and form a single point. For the larger and more refractory ones, a fine sewing needle, set in a wooden handle, and bent at an obtuse angle at the point, may be used.

When the limbs have been properly adjusted, the insects may be laid away to dry, which will require three or four days for the smaller, and twice that time for the larger ones. When dry they may be removed from the card by inserting the point of a fine needle under the shoulder; if this is carefully done the insect will generally come clear off without damage to the most delicate pubescence or the longest bristles. Any portions of the mucilage which may adhere to the elytra, may be removed with the needle point or the sable pencil moistened as before. Each specimen may then be mounted on a strip of card-board, or fastened in the cell of a microscope slide with a minute touch of Canada balsam, and a thin glass cover cemented over it, when it will form an interesting object for examination either by direct or transmitted light.

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#### ACKNOWLEDGMENT.

Prof. Bell has kindly sent with the above paper a series of specimens illustrating the families of insects he has referred to, all neatly mounted on microscopic slides, comprising twenty in all. Many of these are extremely interesting, and the mounting is such as would do credit to an expert. We are greatly indebted to our friend for this liberal donation to our Society's collection. They are valuable not only as beautiful slides for the microscope, but have also been carefully determined and are numbered to correspond with the numbers under which their names are found in Crotch's Check List, and hence will be very useful for reference. This is the second time we have had the pleasure of calling attention to Prof. Bell's liberality in this direction.—ED. C. F.

DESCRIPTION OF THE PREPARATORY STAGES OF  
NEONYMPHA CANTHUS, LINN. (EXCEPT  
THE CHRYSALIS.)

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

**Egg.**—Sub-rotund, broadest at base, and there flattened; surface slightly rough, but without definite markings under a pretty high power; color greenish-white. Duration of this stage about 7 days.

**YOUNG LARVA.**—Length just from egg, .09 inch; color yellow-white; but in a few hours changes to pale green; shape cylindrical, long, slender; the last segment bluntly bifurcated; on each segment a few tubercles, each of which gives out a clubbed white hair; head, at first, nearly twice as broad as 2, obovoid, truncated and depressed; on each vertex a small rounded prominence, indented at top, and from the middle of the hollow rises a little tubercle, with a bristle; color light brown; the surface shallowly pitted, and sparsely pilose; ocelli reddish brown.

At three days from the egg, length .18 inch; color pale green; on either side now appear three whitish longitudinal lines, one near middle of dorsum, one on the verge of the dorsal area, and one on middle of the side. As the first moult approaches, the body becomes broad as the head, and vitreous-green, with the white lines as before described. To first moult about 8 days.

After First Moult.—Length .26 inch; slender, slightly thickest in middle segments; the tails longer in proportion than at first stage, slender, sub-conical, pink-tipped, rough with white pointed tubercles and short bristles; each segment several times creased transversely, and on the ridges so caused are fine white tubercles, with short hair to each; color at first greenish-yellow, afterwards changing to pale green; on middle of dorsum a dark green stripe, free from tubercles; on either edge of this a line of white tubercles, another sub-dorsal, a third along base; between the last two are two other fine white lines, and one such between the dorsal and sub-dorsal; feet and legs green; head broader than next segment, obovoid, the sides more sloping, less rounded, than in first stage; on each vertex a long, tapering process or horn, tuberculated, brown-tipped, and marked in front by a reddish stripe which is extended down

side face to the ocelli; color of face and head yellow-green, the surface finely tuberculated. To next moult 6 to 9 days.

After Second Moulting.—Length from .34 to .4 inch; same shape; color yellow-green; same tuberculated lines; head shaped as before, but narrower and higher, the horns longer, and nearer together; striped as before, but the upper part pink; color of face pale green. To next moult 14 to 18 days.

After Third Moulting.—Length .55 inch; shape and color as at preceding stage; but a few hours after the moult, in nearly all the examples, the colors changed to brown and buff; at 24 hours from the moult, length .57 inch; on middle of dorsum a broad brown stripe, on either side of which is a band of reddish-buff, which changes to greenish on the outer side; on the side another buff band, through the middle of which runs a brown line; the basal ridge buff; head and horns as at preceding stage. A few days later the buff larvæ became lethargic.

But one of the green larvæ proceeded to fourth moult without change of color. From third to fourth moult in the fall, 26 days.

After Fourth Moulting in Fall.—Length .6 inch; color green; but 24 hours after the moult had changed; color now yellow-buff and red-brown; the medio-dorsal stripe pale brown; the bands on either side of it greenish-yellow; the side brown with a dull green line running through it; head shaped as before; face green, the stripes reddish-brown. This larva went into lethargy a few days later, but died during the winter.

One only of three larvæ which hibernated after third moult survived the winter, and being placed in a warm room 15th Feb'y, soon waked up and began to feed. The color gradually changed from buff to green without a moult; color wholly dull green, with a darker medio-dorsal stripe; a yellow sub-dorsal line running from horn to tip of tail; two yellow side lines, obscure; yellow along base; tails green, no pink at tips; head pale yellow, the stripes brown. Twenty-two days after the end of hibernation, passed fourth moult.

After Fourth Moulting in Spring.—Length .62 inch; color pale green, the medio-dorsal stripe dark; the sub-dorsal stripe yellow-white, the two lines on side, and the basal stripe same hue; tails green; head emerald-green, the horns reddish, the stripe down face dark brown. Duration of this

stage 30 days. After fifth moult, length 1 inch; color green, striped with whitish. Twelve days later reached maturity.

MATURE LARVA.—Length 1.2 inch; long, slender, the dorsum arched; the last segment ending in two long, slender, conical tails, which are rough with tubercles; each segment creased transversely so as to make six ridges; the front ridge, from 3 back, is twice as broad as any other, and flattened, the rest nearly equal, rounded; the surface finely tuberculated, each tubercle giving out a fine and short hair; color of body green; a darker medio-dorsal stripe, and on either side of this a pale green band on the outer edge of which is a yellow-green stripe; these stripes and bands occupy the whole dorsal area; on the side a pale green band through which runs a yellow line; along base a yellow stripe; feet and legs pale green; head obovoid, the top narrow, and on each vertex a long, tapering, conical process or horn, the two meeting at base; whole surface rough with fine tubercles, each with short hair; color of head yellow-green, the horns red; down the front of the latter from near the tip a brown stripe, which passes down the side of face to the ocelli.

The only larva I have been able to raise to maturity died before chrysalis, so that I am not at present able to describe that stage.

*Canthus* does not fly in W. Va., and I was indebted to Mr. Chas. E. Worthington, of Chicago, for the first eggs and larvæ I obtained. The eggs were laid by females tied in a bag over grass, 11th to 13th July, 1879. When they reached me, 20th, by mail, some eggs were still unhatched. In all there had been about 50. They were laid on a species of coarse grass growing near the border of Lake Michigan, but the larvæ eat lawn grass readily. The first moult was passed 27th July; the second 2nd Aug., the third 16th Aug.; but at each stage some larvæ lagged behind, so that the third moult came on at various dates up to 2nd Sept. The color of all the larvæ was green till after third moult, when the first which had passed that moult, within 24 hours after it, changed to buff and brown, and 31st Aug., these were evidently fixed for hybernation. But two which passed the moult latest went on to fourth moult, one of them having changed to buff like those first mentioned, and passed fourth on 19th Sept., the other retaining its original color. This last passed fourth on 17th Sept., and about 24 hours after, it also had changed to buff. One of these escaped, and the other went into hybernation, but died during the winter. I lost indeed all the larvæ of the brood.

On 25th July, 1881, I again received eggs from Mr. Wm. E. Gallagher, of Whittings, Lake Co., Ind. When I opened the box there were about 35 newly hatched larvæ. Another smaller lot came from same source 1st Aug. From one cause or other, the most efficient being minute spiders in the sod, and which I discovered only when too late, I had but 3 of these larvæ on 30th Aug., all past third moult. They retained their green color until a few hours after that moult, then turned buff. I sent one of these to Mrs. Peart, in Philadelphia. By 10th Sept., both my larvæ were in lethargy. I recorded on 19th Sept., that one of them had shifted its position. The same thing occurred 29th Sept.; and on 1st of Oct., the same uneasy larva left the grass and climbed four inches up the glass cylinder which covered it. On 12th Nov., this larva had moved again, and next on 4th Dec. Meanwhile the one which had been sent to Philadelphia behaved differently, and went on to fourth moult, passing it 27th Oct. One of my two died, but the other I brought into a warm room on 13th Feb. (temp. outside 65°), and placed in the sun. In about fifteen minutes it moved and soon after had eaten. When brought in, it was much shorter and smaller than when it went into lethargy. It had been .6 inch then in length, now it was less than .4 inch. By 25th Feb., it had reached .5 inch, and 2nd March had fully recovered its former length, .6 inch. Early in March, it began to change color, and by the 6th had become green. It reached .66 inch before it passed fourth moult, which occurred 24th March. The larva which had passed the winter in Philadelphia had escaped, and I sent this last survivor of the brood to Mrs. Peart. It passed fifth moult 25th April, and continued to feed, by the 7th May becoming full grown. After which it did not increase in size, seemed to be at rest all the time, and finally died 2nd July, before pupation. So that the egg which had been laid in the middle of July produced a larva which had not pupated 2nd July the next year. So protracted are the stages in several of the *Neonymphæ* larvæ that rearing them becomes excessively tedious, the more so as during the months when they are feeding they require daily looking after.

When at rest, the *Canthus* larvæ, as do those of all this genus, have their heads turned down and under, so that the horns are nearly in same plane as the dorsum, after the fashion of *Apatura* larvæ. When feeding, *Canthus* has the tails elevated at about 45°, and separated. They rested much on the glass cylinder at times, especially just before and during the moults, and spun for these occasions quite a web on which to support



themselves. When weaving, the larva made a circular motion with its head, all the time advancing slowly, and the result was a succession of loops like figs. 8.

I have now bred from the egg every species of *Neonympha* found east of the Mississippi River and north of Texas to the Rocky Mountains, in all cases but *Canthus* obtaining chrysalids. These species are *Eurytris*, *Sosybius*, *Arcolatus*, *Gemma* and *Canthus*.\* Of *Henshawii* I received, in summer of 1881, eggs from Mr. Doll, in Arizona. They were dead, and no larvæ had been hatched. The shape of the egg was like that of *Canthus*, but there was a fine net work of lines over the surface, as in *Gemma*. In fact, the eggs of the six species spoken of are alike in shape, almost globular, flattened at the bottom, and all but *Canthus* show distinct reticulations over the surface. The larvæ fall into groups, *Canthus* and *Gemma* forming one, then *Arcolatus* one, *Eurytris* one, *Sosybius* one, this last coming nearest the true Satyrids (*Alope*, &c.). The heads of the young larvæ, from egg, are round, or truncated ovoid, and except *Sosybius*, all have processes on vertices at this stage. *Gemma* begins with a pair of high, divergent, conical horns. At first moult, these are of same description, but higher in proportion, and the horns are retained to last stage. *Canthus*, at first, has on each vertex a depression, and out of the middle of this rises a low cone. But at first moult, the larva takes on a pair of long, conical horns, and carries them through all stages. *Arcolatus* begins with an ovoid knob on vertex, and two others smaller down each side of face. At first moult, there is a low cone on vertex and those on face are suppressed. And essentially the same sort of process runs through all subsequent stages. In the last, it is small, short and pointed. *Eurytris*, at first, has a round head, shaped like a Satyrus, but on vertex is a rounded knob. After first moult the shape of head changes to the *Neonympha* type, sub-ovoid, truncated, and the knob is continued. Same in next two stages, but at fourth moult (and last) these processes are a little longer, pointed and compressed. *Sosybius* begins with a round head, no processes on vertex, and goes through all stages in same manner. *Canthus* and *Gemma* are long and very slender, and both change from green to brown when about to hibernate, and back to green again after the hibernation, and before a moult. *Arcolatus* also is long and slender. But *Eurytris* and *Sosybius* are stout, and more in shape like *S. Alope*. The

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\* All these have been described, as to their preparatory stages, in this magazine.

chrysalids of *Arcolatus*, *Eurytris* and *Sosybius* have the same general shape of *S. Alope*; stout and short, with the anterior end truncated, almost cut squarely off beyond mesonotum. But *Gemma* is long, slender, with the head case produced, and ending in two long conical processes like the horns of the larvæ. Probably *Canthus* will be found to have a chrysalis of this description. Debis *Portlandia*, in all its stages, comes very near Neonympha. In the first two stages it most resembles *Canthus*; after that, *Canthus* and *Gemma*. Its chrysalis is of the Satyrid type, very like that of *Alope*. The egg differs from all the species somewhat. It is of the same general shape, however, but has a rounded protuberance on the under side, and a smooth surface. Judging by the preparatory stages of *Portlandia*, Debis ought to stand next Neonympha in the catalogues, instead of being separated from it by several genera, as *Cœnonympha* and *Erebia*. The preparatory stages of these two genera I only know from European authors, but species of both have barrel-shaped, ribbed eggs, and caterpillars with round heads, and no processes on vertices. These agree, therefore, with *Satyrus*, and the genera should stand near *Satyrus*. The more I see of the preparatory stages of butterflies, the more I am impressed that no system of arrangement is a true one which does not consider these. Each unquestionably natural genus in the American diurnals is as distinct in its several stages as in the imago, so far as these are known. Between such genera fall some others less clearly defined, with the stages spoken of lying midway between also; as *Euptoieta*, which has the egg of an *Argynnis*, but the chrysalis of a *Melitæa*, while the larva is neither one or the other, though resembling *Argynnis* somewhat.

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## THE NORTH AMERICAN SPECIES OF NEMISTRINIDÆ.

BY S. W. WILLISTON, NEW HAVEN, CONN.

The family of Nemistrinidæ comprises throughout the world one hundred and ten described species, six or seven of which are from Southern Europe and three from North America; the remainder nearly equally distributed in Asia, Africa, Australia and South America. In their habits, so far as known, the species approach the Bombylidæ most closely, as also do many in their general appearance. Structurally they are of interest to

the Dipterologist, on account of their intricate and diverse neuration, which in some species is almost Neuropter-like in the reticulation.

Doubtless the number of our species will be augmented by future discoveries, but yet we can never expect a very material increase.

Our three described species, to which I here add a fourth, may be diagnosed as follows. I have never seen Macquart's species, but it may be distinguished without difficulty.

A. Proboscis short, protruding but little from the opening of the mouth. Antennæ small, short, broadly separated; wings not reticulate, three submarginal cells, the outer posterior one closed before the border of the wing, first posterior cell open, fourth (the one just behind the discal cell) closed, anal cell narrowly open.

a. Eyes pilose, second posterior cell open.—*Hirmoncurea brevirostris*.

aa. Eyes bare, second posterior cell closed before the border of the wing.

*H. (Parasymmictus) clausa* O. S.

B. Proboscis long, directed backwards. Face without protuberance; antennæ small, short, very broadly separated, third joint nearly orbicular, style of three joints. Eyes bare, contiguous in the male; ovipositor of female with two slender diverging lamellæ. Wings not reticulate, three submarginal cells, the outer ones open, first posterior cell open, fourth closed, the anal cell open.

b. Third joint of antennæ nearly orbicular, or slightly pear-shaped, third joint of style not much longer than first two together; second posterior cell closed and petiolate. Abdomen indistinctly fasciate. Length 9 m.

*Rhynchocephalus Sackeni*, Wlstr.

bb. Third joint of antennæ obtusely oval, third joint of style three times as long as first two together. Wings more slender, second posterior cell open. Abdomen distinctly fasciate. Length 12 m. *R. volaticus*, sp. nov.

*Hirmoncurea brevirostris*, Macquart, Dipt. Exot. Suppl. 1, 108, 8; Tab. 20, fig. 1. Yucatan. This species differs from the type of *Hirmoncurea* (*H. obscura* (W.) Meig.) in the pilosity of the eyes, and closed second submarginal cell. Baron Osten Sacken mentions (Cat. Dipt. note 142) that he had seen a specimen of *Hirmoncurea* from Colorado with the second posterior cell open. It is possibly this, but I suppose a new species.

*H. clausa*, O. Sacken, Western Dipt. 225, Texas.

Syn. *Parasymmictus clausus*. Bigot, Bull. Soc. Ent. Fr. 1879, No. 8; Annales 1881, p. 15.

The genus *Hirmoneura* has been used in a wide sense, but if such characters are made use of as serve to distinguish genera in allied families, most of the species would become generic types. The closed submarginal and second posterior cells in this species have induced Bigot to make it the type of a new genus, but the same reasons would require new generic names for *H. brevisrostris* and the species of *Rhynchocephalus* described below. For the present, therefore, I believe it will be better to hold *Parasymmictus* in abeyance.

*Rhynchocephalus Sackeni*, Wltn., Trans. Conn. Acad., vol. iv. p. 243, 1880.

Belongs in the division with closed second posterior cell, to which *R. Tauscheri* Fischer, the type, pertains. A male specimen from Washington Territory, since received, has the proboscis considerably shorter, the eyes nearly contiguous near the ocelli, ocelli with a conspicuous tuft of black pile and the style of the antennæ very indistinctly jointed, even under a compound lens.

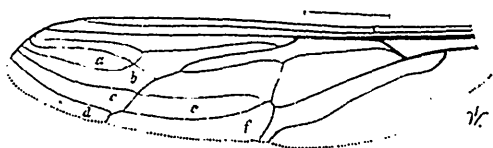


FIG. 4. —Wing of *Rhynchocephalus volaticus*, Wltn. — *a*, third submarginal cell; *b*, *c*, *d*, *e*, *f*, first-fifth posterior cells.

*Rhynchocephalus volaticus*, sp. nov.

♀. Black with light yellowish pile. Head brownish black, thickly clothed with pile. Front thinly blackish pilose on the upper part; on the lower part, the face, cheeks and occiput with abundant sulphur yellow pile; antennæ short, reddish yellow, first joint concealed by the pile, second joint sub-quadrangle, third joint obtusely oval; first joint of style very short, second about twice as long, third joint three or four times as long as first two together. Proboscis reaching about to hind coxæ. Thorax brownish black, clothed with the same sulphur yellow pile, abundant and bushy on the pleuræ and pectus, on the dorsum thinner, the ground color

showing through. Abdomen short and broad, brownish black; second segment above thickly yellow pilose in the front part, behind more or less black, its hind border and the hind borders of the remaining segments conspicuously fringed with white tomentum: second, third and fourth with black somewhat intermixed with yellowish tomentum: remaining segments more or less clothed with yellowish pile, third and fourth segments on the sides with conspicuous tufts of black pile. Lamellae of the ovipositor slender, black, about as long as intermediate femora. Legs brown, femora concealed by abundant yellow pile, especially in the proximal parts, tips yellowish, hind tibiae and tarsi blackish. Wings hyaline, more slender than those of *R. Sackeni*, first and second submarginal, and first and second posterior cells open, third and fifth lying along the posterior margin, separated by the vein running into the posterior border. Length 12 m., of wings 11 m. Two specimens, Florida. Prof. Riley.

When denuded, the second and third segments of the abdomen may show a large reddish spot on each side: they are probably not, however, a constant mark. This species agrees with *R. caucasicus*, Fischer, in having the second posterior cell open.

The three other species of this genus now known are *R. Tauscheri*, Fischer, and *R. caucasicus*, Fischer, from Southern Russia and Asia Minor, and *R. albofasciatus*, Wied., whose habitat is unknown. That *volaticus* is not the same as *albofasciatus* seems evident from the description of the abdomen. The white fasciae are on the extreme hind borders, with the remainder of each segment black, while in Wiedemann's species the white fasciae are in front.

## ON THE NORTH AMERICAN CALPINE TO HELIOTHINE.

BY A. R. GROTE.

Since the groups are very difficult of scientific definition in the *Noctuide*, the present must not be considered as standing on more than a comparative basis. In my New Check List the genera are arranged between the *Calpine* and *Heliothine*. The arrangement I would only modify by restricting the *Calpine* to the North American genera—*Calpe*, with one species, perhaps the same as the European, and *Phiprosopus*, with the species *callitrichoides*, called a Geometrid by Zeller, and which in outline has a resemblance to the aberrant Noctuid genus *Doryodes*.

which I have placed among the *Nonagriine*, or *Nonagriade* of Dr. Harris. The group which I have called *Stiriine* is in some measure intermediate between the *Calpine* and *Plusiine*. The fact that the tibiae are often armed with a claw (*Stiria*, *Basilodes*) may be taken as an approximation to the *Heliothine*, where the tibiae are usually armed and have the tibiae spinose.

The typical genus of the *Plusiine*, *Plusia*, has a wide distribution and is numerous in species. The type is the European *P. chrysitis*, and we owe the generic name to Fabricius. I would refer the student to my Catalogue of May, 1874, where I have been at pains to give the date and the types of the genera then described. This labor will, I think, be found to have been well expended, and to afford a good and reliable basis for the generic synonymy. However we may extend or alter the contents of the genera, it is well to keep the real meaning of the generic names before us by a reference to the type. We can thus judge how far we are willing to depart from the typical structure for the purpose of getting good working genera. I add here the generic types since 1874 and arrange the genera as follows. I do not think the labial palpi of *Plusiodonta* are really intermediate in form between *Calpe* and *Plusia*, but it is not unreasonable to follow with that genus.

The two groups or sub-groups differ as follows: Front often prominent, rough, with a roughened projection, sometimes circular, cup-like, or hardly depressed, or with a central elevation; again with a superior ridge or a tubercle; labial palpi weak, with the terminal joint conical or concealed; abdomen smooth, untufted, often with exerted ovipositor. The infraclypeal plate is pronounced. *Stiriine*.

Front smooth, tibiae unarmed; palpi moderately long, with pointed third joint; vestiture more hairy; body often tufted on dorsal line. *Plusiine*.

a. *Stiriine*.

*BASILODES* Guen. (1852).

*Type*: *Basilodes Pepita* Guen.

Eyes naked, unlashd. Thorax quadrate; patagia deflected at tips. Vestiture consisting of hair-like scales, mixed with broader scales and with short, broad, underlying scales on thorax. Fore tibiae not truncated, with a single terminal claw; middle and hind tibiae unarmed. Body untufted; ♀ abdomen terminating in a somewhat sudden slope to the extruded ovipositor. Palpi hairy, projecting beyond the front, with conical third joint.

Clypeus full, rising to a black wrinkled protuberance, circular, a little depressed on top with the rim hardly raised. Wings of the usual *Plusia* shape, pointed at tips, and the primaries are rather broad, outer margin full.

1. *Pepita Guen.* West Virginia; Kansas.
2. *Chrysopsis Gr.* Arizona.

The first species is larger, fore wings metallic, golden, with fine ordinary lines; the latter paler, smaller, with a golden lustre over sub-terminal space. The relationship between this and the following genera is expressed by the fine oblique lines crossing primaries.

#### STIRIA Grote (1874).

*Type*: *Stiria Rugifrons Gr.*

Eyes naked, unlashd. Front with infra-clypeal plate noticeable and with a cordate impression having a raised tubercle, in the type near the lower edge, and in *Sulphurea* more central. Labial palpi with third joint concealed, less prominent than in *Basilodes*, from which this differs by the character of the frontal excavation. Legs unarmed, fore tibiae with a terminal claw. Wings wide with a *Plusia*-like tooth at internal angle of primaries. Thorax somewhat short and quadrate, like *Basilodes*, the tegulae a little more deflected at tips. The characters are fully given Bull. B. S. N. S., 73, 1874, where I failed to note its resemblance to *Basilodes* for the simple reason that I did not then know that genus. Both species are yellow with frosted purple patches and terminal space, the type larger and paler. *Sulphurea* intense yellow, somewhat more lustrous, smaller, and the purple patches hardly frosted.

1. *Rugifrons Gr.* Kansas; Colorado.
2. *Sulphurea Neum.* Arizona.

#### STIBADIUM Gr. (1874).

Differs by the infra-clypeal plate being more prominent, the labial palpi shorter. The clypeus is elevated and furnished with a moderate impression, more like that of *Basilodes* than *Stiria*. Like *Stiria*, the primaries are produced at internal angle, but the wing is a little narrower, with straighter costal edge than either of the other genera. The fore tibiae have a terminal claw; the eyes are naked and full. The characters separating these three genera are mainly comparative, and they may be optionally held to indicate groups in a single genus, which must then take the name of the first genus. The type is uniformly pearly fuscous and

looks a good deal like the common *Gortyna nebris*; in *Aureolum*, a much prettier species, the subterminal field is pale golden yellow and thus approaches *Stiria*; the ♀ ovipositor is exerted.

1. Spumosum Gr. Kansas; Illinois.
2. Aureolum Hy. Edw. Arizona.

FALA Gr. (1875).

Type: F. Ptycophora Gr. Proc. Ac. Nat. Sci. Phil., 425.

I have figured the single species in my Illustrated Essay, and the diagnosis is given as above.

1. Ptycophora Gr. California.

PLAGIOMIMICUS Gr. (1873).

Type: P. Pityochromus Gr.

Front with an empty and exposed cup-shaped protuberance, the frontal scales being short and mossy. A slender terminal claw on front tibiæ. In *Tepperi* the frontal excavation is less prominent, but otherwise this species agrees. As compared with the preceding genera, the three species are slenderer and have a casual resemblance to the Heliothid genera *Schinia* and *Lygranthocia*. As in *Stibadium* the labial palpi are short, here they hardly reach the top of the more prominent infra-clypeal plate in the more typical forms. The species are olivaceous fuscous (*Pityochromus*, *Expallidus*), or of a delicate olivaceous green (*Tepperi*). Both Mr. Morrison and Mr. Smith wrongly give the fore tibiæ of *Tepperi* as unarmed.

1. Pityochromus Gr. Mass. to Kansas and the South.

*Schinia media* Morr.

2. Expallidus Gr. Montana.
3. Tepperi Morr. Southern States, Arizona.

This genus may be considered as a division of *Basilodes* with the others which I have associated with it. The primaries do not show the tooth of *Stiria*. The course of uniting these genera seems to me not unadvisable, but the fate of one must be that of them all. Although the characters are principally the same and only offer comparative differences, allowing no value to the tooth or the modifications in shape of primaries, it is not a little singular that each has two or more species united by structural detail, general appearance, color and pattern, all, properly speaking, rather sub-generic than generic characters. The best marked seems to me *Plagiomimicus*, where the cup-like clypeus is rather narrower, much



exposed, and the infra-clypeal plate is prominent, not exceeded by the short labial palpi, and *Fala*, where the cup has a strong tubercle. *Basilodes* has the terminal palpal article conical and prominent, and apparently differs from the rest in this respect.

CHAMAECLEA Gr. (1883).

*Type*: *C. Pernana* Gr.

Allied to the genera typical of the *Stiriinae* by the bulging clypeus and *Plusia*-shaped wings. Front with a slight depression, rising in the middle. Vestiture scaly. Tibiæ unarmed; in all the examples I have seen the fore legs are broken off. Fore wings wide, produced at internal angle. The tegulæ are not deflected; the thorax short. ♂ antennæ simple.

1. *Pernana* Gr. Arizona. This genus is curious for the way in which *Chamaeclea Pernana* mimics *Chariclea Delphinii*.

CIRRHOPHANUS Gr. (1872).

*Type*: *C. Triangulifer* Gr.

The eyes are full, naked, unlashd. The clypeus has a central rounded tubercle. The vestiture consists of hair-like scales with broader ones, arranged like shingles, rising from the thorax, which is short and in shape allies the moth to this group. The fore tibiæ are also not truncate, but as long as in the preceding genera and unarmed. The parts of the thorax resemble the preceding genera, but there is a divided posterior tuft. The patagia are not as deflected as in *Plagiomimicus*, but do not lie close to the thorax. The female ovipositor is not exerted. The abdomen is untufted. The labial palpi have the terminal joint concealed and are not unlike though longer, the palpi of the genera separated here from *Basilodes*, but unlike that genus. The antennæ have the basal joint scaled. The palpi are rather thickly haired. The tibiæ are unarmed. Wings ample, without tooth, rounded exteriorly, with blunt apices, and running in a little and forming a prominent angle at internal margin. The genus seems to be somewhat intermediate between the preceding and *Plusia*. The species is golden-yellow with orange-brown lines disposed somewhat like the European *Chariclea Delphinii*.

1. *Triangulifer* Gr. Ohio, Missouri.

*Pretiosa* Morr. (*Chariclea*).

Figured in my Illustrated Essay under *Chariclea*. I believe that *Pyrrhia* of Speyer, Hulner and myself, of which the type is the European *Umbra*, and of which we have three congeneric American forms, *Exprimens*, *Angulata* and *Stilla*, is a different genus from *Chariclea* Kirby, of which the type I take to be the European *Delphinii*. I originally referred the moth as allied to *Gortyna*, and it may yet be better placed there when its early stages are known.

ACOPA Harvey (1875).

*Type*: *Acopa Carina* Harvey.

In this genus the body is linear and slight, the tibiae unarmed, ocelli small, male antennæ brush-like with distinct joints, thorax with a tuft behind (in which it resembles the Heliothid genera *Oxyenemis* and *Triocnemis*), abdomen untufted, linear. The neuration is somewhat distinctive. Fore wings 12-veined with accessory cell, from the outer apex of which spring veins 7 and 8, 9 out of 8, a long furcation to costa. Hind wings 7-veined; median 3-branched; 8 out of 7 not far from the base. The legs are slender, tibiae unarmed. Dr. Harvey gives the characters in the Buffalo Bulletin, and figures the type from a Texan example. The species are white, hoary or pallid. I have seen the type of *Incana*, which is sufficiently distinct in appearance, but from its vague markings looks like some suffused varieties, as for instance, var. *Planus* of *Anytus Sculptus*. *Carina* is the smaller species; the type had the secondaries dark fuscous, but another specimen was paler. *Perpallida* is much stouter, the lines different, and it differs structurally in the smaller accessory cell on fore wings. It is chalky white, shaded with ochrey, and with narrow fuscous lines, the median farther apart than in *Carina*.

1. *Carina* Harvey. Texas.
2. *Perpallida* Gr. Kansas.
3. *Incana* Hy. Edw. Arizona.

(To be Continued.)

#### MEETING OF THE ROYAL SOCIETY OF CANADA.

A meeting of the above Society is to be held in Ottawa on the 22nd inst., when it is expected that many valuable papers will be presented. The Royal Society having honored the Entomological Society of Ontario by placing its name on the list of Societies who may send a delegate to take part in the proceedings, the Council have chosen Mr. James Fletcher,

of Ottawa, as the representative of our Society. We would call attention to the following letter from Mr. Fletcher:—

MY DEAR SIR,—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 am, my dear sir, yours truly,

J. FLETCHER.

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#### OBITUARY.

It becomes our painful duty to announce the death of one of the founders of our Society and its first President, Prof. Henry Croft. He died at Hermanitas, Texas, on the 28th of April, of dropsy, aged 63 years. Ever since the organization of our Society he has taken the deepest interest in its welfare. Early in life while in Europe he was an ardent collector, devoting most of his attention to Hymenoptera; but after accepting the position of Professor of Chemistry in the University of Toronto, which he filled with much credit for many years, his time was so fully occupied with his professional duties as to leave him but little opportunity for entomological pursuits. Yet he never lost his interest in this, his favorite department of natural history. For many years past his eyesight had failed to such an extent as to prevent his collecting, and his health also was too poor to permit of it. Several years ago he resigned his position in the University and removed to Texas with his family, with the hope of benefiting his health. His death was quite unexpected. One of his much esteemed colleagues thus writes of him: "His last letter to me, written about ten days before his death, showed much of his old interest in natural history, some of his familiar humor, and a kindly interest in his friends here. I look back with pleasure on many years of work with him as a colleague. I ever found him genuinely straightforward, guileless and upright." His memory will ever be cherished by those of us who knew him well as a kind and disinterested friend.

## CORRESPONDENCE.

Although the snow still heavily shrouds the earth, and the air is frosty, the stern, cold sway of winter must soon be ended, and naturalists will again go forth into the fields and forests. Before entering, however, on the coming campaign, I would like to record for my fellow collectors a few facts culled from my copious notes of the past one. The spring of 1882 was very backward, so that insects were unusually scarce during April and May. On the other hand, the autumn was prolonged and fine, and many species could be collected up to the end of October. On April 25th, I carefully searched the pines for Buprestidæ (which at the same date in 1881 were abundant), but could not find a single specimen. On May 11th, a second investigation resulted in the finding of only two specimens of *Chalcophora liberta*, Germ. On June 6th, this species was abundant, and several specimens of *C. virginensis*, Dr., and *Chrysobothris Harrisii*, Hentz, were also taken. *C. virginensis*, Dr., *C. liberta*, Germ., and *C. fortis*, Lec., were taken again on several days between September 24th and October 16th. On April 30th, Tiger Beetles were making their appearance, and some specimens of *C. vulgaris*, Say, were taken just emerging from their winter quarters in the sand, under stones and chips. *C. sexguttata*, Fab., as is well known, frequents paths and clearings in woods. On wet or dull days it may often be found sheltered under the loose bark of fallen trees, or in the deserted burrows of borers, down which it retreats when disturbed. While stripping the bark from a large prostrate maple on May 22nd, to obtain larvæ, I captured three of these beautiful beetles, which had thus been driven to shelter by a shower. The tree yielded numerous specimens of *Eupsalis minuta*, Drury, and some pupæ of *Saperda tridentata*, Oliv., from which imagos emerged on June 15th. On June 16th, while beating the branches of a butternut, I found upon my net a Curculio (blackish with an oblique white dash on each elytron), which was new to me, but could find no more upon the tree. As I was leaving the field in which it stood to enter an adjoining wood, I saw upon the gate-post a similar weevil, and a glance around showed me a large butternut growing but a short distance away, and having a large dead limb resting on the fence. I at once concluded that the weevils had come from this, and, on examining the decaying limb, hundreds of the beetles were found upon it. On a length of only five or six feet I took fifty, nearly all of which were paired and copulating. The beetle proves to be *Pseudomus truncatus*, Lec. On the 21st I took two specimens of *Cepha-*

*loon lepturoides*, Newm., as well as several of *Dendroides concolor*, Newm., and other fine species. Among the beetles mentioned by Dr. Le Conte as bred from hickory twigs, is *Chariessa pilosa*, Forst. During the latter part of June and the following month numerous specimens of this handsome beetle were observed upon felled and old hickories. They were very active,—coursing about in search of prey, and doubtless destroying many insect enemies of this tree. One was seen devouring an *Agrilus egenus*, Gory, and a second feasting on *Magdalis barbata*, Say, both injurious and abundant species. The delicate and rare Buprestis, *Paxilonota cyanipes*, Say, was captured on June 22nd, upon a dead willow, which I hope may yield me more during the coming season. On the same day a very fine female *Bellamira scalaris*, Say, was taken ovipositing on an old maple stump. Beating low bushes on the margins of a small lake yielded numerous species, including *Cupes concolor*, Westw., the only specimen of this family which I have yet taken. During September the Locust-borer, *Cyrtene robinia*, Forst., was very abundant in all parts of the city. Although I had never previously captured the beetle, I knew from the decayed condition of our locust trees (which are not numerous), that it must infest them. In the latter part of the month, *Æcanthus niveus* was, as is usual, in large numbers on raspberries, and in full song, if we can so designate its musical performance. An interesting feature of its concerts is one of which I have not been able to find any mention in books accessible. While the male is energetically shuffling together its wings, raised almost vertically, the female may be seen standing just behind it, and with her head applied to the base of the wings, evidently eager to get the full benefit of every note produced. On October 7th, I discovered in the seeds of the basswood some lepidopterous larvæ of which I would be glad to hear from members studying lepidoptera, as I can find no mention of any moth attacking the fruit of this tree. Do the larvæ leave the seeds, and, as they have the power to do, lower themselves to the ground, or do they remain until the seeds fall from the tree? The seeds are completely eaten out, and I noticed in a double-seeded fruit that after finishing one seed, the larva proceeded to the other.

Ottawa, 30th March, 1883.

W. HAGUE HARRINGTON.

P. S.—I would like to obtain, by exchange or purchase, a copy of the First Report of the Society, to complete my set of its publications.