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ENTOMOLOGY FOR BEGINNERS—No. 2.

THE NORTHERN MOLE-CRICKET (*Gryllotalpa borealis*, BURM.)

BY JAMES FLETCHER, OTTAWA, ONT.

Anyone finding the strange-looking insect shown at fig. 1 will at once recognize it as the Northern Mole-cricket. It is apparently an uncommon insect in Canada, and it is partly to ascertain from the readers of the CANADIAN ENTOMOLOGIST whether or not this is the case that I am writing these notes upon a specimen which I have had in confinement for some months. I have been trying for years to get living specimens, but only succeeded last autumn when I had a fine female sent to me by Mr. W. W. Hilborn, who had caught it in his garden at Leamington, in Essex County, Ont. A short time afterwards I received from the same locality, from Mr. G. H. Mills, a male, but this was unfortunately injured in transit and died the day after arrival. There is to my mind nothing more interesting than keeping insects alive and watching their habits. This, too, after a little experience, becomes an easy matter if their habits are considered. I cannot, however, say that my Mole-cricket has been a very entertaining pet owing to its subterranean and nocturnal habits. I prepared a home for it in a large glass jar, 8 inches in diameter, and filled to the depth of about a foot with light, rich, sandy loam. Upon this was placed a potato and a small sod of lawn grass. The potato and grass soon threw out vigorous roots which now reach to the bottom of the jar. In the soil were also placed some earth-worms, as the food of Mole-crickets (like that of the other members of the *Gryllidæ*, or crickets to which it belongs) is of a mixed nature, and they are said to be particularly partial to earth-worms.

The name Mole-cricket is very appropriate for this insect, it is plainly a cricket, and at the same time its habits and even general appearance, but particularly the form and uses of its strong fore-legs, closely resemble those of the little mammal from which it takes its name. Our excellent



FIG. 1.

figure, which has been kindly lent by Prof. J. A. Lintner, shows the female natural size. The sexes differ very little. The male is slightly smaller. Westwood says :—" Indeed, as the females are destitute of an exerted ovipositor, it is only by a minute inspection of the veins of the wing covers that the sexes may be distinguished. The females in this family are not able to make a noise, the veins of their wing covers being more regularly disposed. The males are, moreover, distinguished by having eight ventral segments in the abdomen, whilst there are only seven in the females." (Mod. Class. I, 443). There is only one species of Mole-cricket recorded from Canada. It is of the form shown above, of velvety seal-brown colour, which is darkest on the thorax. The wing covers are greyish, with dark veins, and the true wings are white and folded together like a fan. They are much larger than would be imagined from their small tail-like tips, which show beyond the wing covers on the back. The most remarkable feature of these insects is the strong fore-legs, with their expanded paw-like shanks, which bear four claw-like curved and hollowed projections at the lower edge ; two of these are jointed at the base, and are in fact claws. The feet consist of three joints, which are attached about the middle of what, by the shanks being twisted obliquely outwards, is now the outside instead of the lower side. They consist of three joints : the first and second are large and claw-like, the second the smaller but reaching almost as far as the tip of the first ; the third is very small indeed, and bears two weak true claws. The first two tarsal joints being of the shape described give great strength to the insect's " paw " when used for digging, for they lie right in front of the two articulated projections of the shank which fit closely to them, and the weak terminal joint lies between. The adaptability of these limbs for their required use is at once seen by the rapidity with which these insects dig down out of sight again when disturbed.

As stated above, Mole-crickets are nocturnal in their habits. They live in moist ground and near streams, where they sink their burrows some inches beneath the surface ; but also throw up little ridges as they burrow nearer the surface, like miniature mole-runs.

They have not the power of jumping highly developed like other crickets, but can swim with ease if they fall into water. Their little shining black eyes, velvety coats and flexible bodies recall strongly the appearance of the otter, particularly when emerging from the water or crawling over stones. On the whole these interesting creatures are the most mammal-like insects I have ever seen. They keep in their burrows the greater part of the time, and I have only been able to catch sight of my specimen by going in quickly at night with a light. They move backwards with almost as great ease as forwards, the two caudal bristles being evidently very sensitive, for which reason they were designated caudal antennæ by one writer. The song of the male is described as "a low, continued, rather pleasant trill, quite similar to that of the common toad, but more shrill."

In Europe the Mole-cricket is described as being very injurious in certain localities from eating the young roots of plants and burrowing amongst the roots. There seems to be as much controversy, however, with regard to it as there is amongst farmers as to whether the mole is an injurious animal or not. Dr. Ritzema Bos says those who think that the Mole cricket is only injurious by burrowing beneath plants make a great mistake. The methods suggested for destroying it, should it at any time occur in large numbers, are the destruction of the eggs, which are laid to the number of from 200 to 400, in chambers about six inches beneath the surface of the ground, or killing the adults by means of poisoned baits, as grated carrot or potato mixed with arsenical substances.

Dr. Lintner says, Rep. VI., p. 151: "A method recommended by Kollar and approved by Curtis, as probably the best where the insect abounds, is to dig pits in the ground in the autumn, of a foot in diameter and two or three feet deep, to be filled with horse-dung and covered with earth. At the first frost all the crickets will be attracted to and congregate in these pits for warmth, where they can be conveniently killed." I shall be glad to hear from any reader of the ENTOMOLOGIST who may find this insect in his neighborhood, and also for any definite information concerning the food and habits. My jar is well filled with roots, and I frequently put a piece of raw meat on the surface of the ground, but I cannot say that I have ever seen that either it or the roots were much eaten. The ground is burrowed in every direction by clean burrows about as large as an ordinary lead pencil, and the Mole-cricket may sometimes be seen at night moving about in these burrows apparently in good health and quite at home.

TWO NEW ORTHOPTERA FROM INDIANA.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

LOCUSTIDÆ—XIPHIDIUM. Serville.

Xiphidium Scudderi, nov. sp.

Female.—Front and sides of head and body dark reddish-brown; vertex, disk of pronotum and tegmina greenish-brown in life, (dull yellow after immersion in alcohol). A dark reddish-brown stripe extends from the front extremity of the fastigium to the posterior border of pronotum, and contrasts strongly with the general colour of vertex and disk of pronotum. Femora greenish-brown punctate with many dark brown impressions on their upper surface; the tibiæ darker. Antennæ with the basal third reddish, the remainder fuscous.

The apex between the eyes rather broad, with the sides rounded; the cone projecting strongly upward and forward and much more prominent, though narrower, than in *X. strictum*, Scudder.

The tegmina cover two-thirds of abdomen; the wings are shorter, reaching to middle of abdomen. Ovipositor of excessive length, almost twice as long as body; slender, and nearly straight until near the apex, where it is curved slightly upward. The posterior femora and tibiæ are also longer and more slender than is usual with members of the genus.

Measurements: ♀, length of body, 18 mm.; of antennæ, 52 mm.; of tegmina, 9.5 mm.; of wings, 7 mm.; of posterior femora, 16 mm.; of posterior tibiæ, 16 mm.; of ovipositor, 30 mm.

A dozen or more females of this striking species were taken from the margins of a large pond in Vigo County, Ind., on October 11th, 1891. Although in company with *Xiphidium strictum*, Scudder, and *X. brevipenne*, Scudder, yet it was at once noticeable on account of its dark glossy-brown colour and exceedingly long ovipositor. Careful search was made for the males, both then and two weeks later, when the pond was again visited, but none were found, and on the latter visit but one female was seen. Those taken were on the stems of the partially fallen rushes and sedges which filled the margins of the pond. When disturbed they gave two or three enormous leaps, and then moving rapidly for some little distance would endeavor to hide beneath the mass of fallen vegetation.

Since the above was in MSS., Mr. S. H. Scudder, in whose honour the species is named, and to whom specimens were sent, suggests that

McNeill's *Xiphidium* sp. ?, mentioned in PSYCHE, VI, 24, as being deformed and having the ovipositor two and a-half times as long as the body, may have been this species.

GRYLLIDÆ—APITHES = (HAPITHUS), Uhler.

Apithes McNeilli, nov. sp.

Female.—Front margin of pronotum of same width (3.5 mm.) as head, slightly incurved; posterior margin but little broader, truncate. Tegmina slightly exceeding the abdomen, entire at the tip, the dorsal field the longer. Wings extending 2.5 mm beyond the tip of tegmina. Posterior femora stoutish, exceeding the abdomen. Posterior tibiæ of same length as the femora, armed with two slightly divergent rows of spines on lower face—eight on the inner margin and five on the outer, besides the three at the apex on either side, the middle one of which is twice as long as any of the others. Between each two of the larger spines in the outer row are two small ones, about one-fourth the length of the large ones. The basal joint of tarsus has also a row of five spines on either margin of its lower face, the apical pair of which are much the longer.

The top of head, disk of pronotum, and the tegmina, are covered with a fine soft pubescence, visible only with the hand lens. All the tibiæ and upper and lower borders of posterior femora more coarsely pubescent with yellow hairs.

General colour, after immersion in alcohol, a dull brownish-yellow. A dark brown stripe reaches from eye to posterior border of pronotum. The tegmina with a small brown spot at their base, and the vein separating the dorsal from the lateral field with a number of oblong dark spots; the cross-veinlets are also much darker than the ones running lengthwise, giving the dorsal field a checkered appearance. All the femora are rather thickly marked with small dark spots, those on the posterior pair being arranged in regular rows. Extreme tip of ovipositor black.

Length of body, 16 mm.; of antennæ, 42 mm.; of tegmina, 14.5 mm.; of posterior femora, 9 mm.; of ovipositor, 12 mm.

A single female, the type specimen, was taken October 21st, 1891, from the lower leaves of a golden rod, *Solidago latifolia*, L., which grew in a thick upland woods in Vigo County, Ind.

I have named the species in honour of Prof. Jerome McNeill, of Fayetteville, Arkansas, a well-known writer on Orthoptera, and my first instructor in entomology.

SOME INDIANA ACRIDIDÆ.—II.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

Since my first paper on "Indiana Acrididæ," which was published in the ENTOMOLOGIST for April and May, 1891, was prepared, six additional species have been taken in Vigo County. Of these, one is new to science; a second has been known in the United States only from Florida and North Carolina; of a third, but one specimen, a female, has hitherto been recorded, and from it Dr. Thomas described the species; while a fourth has not before been taken west of New Jersey. With the habits and local distribution, as far as noted, of these six species, together with the description of three of them, the present paper deals.

The following works may be added to the list given in the preceding paper to which the synonymy refers:—

Comstock, J. H.—An Introduction to Entomology, I., 1888.

Fernald, C. H.—The Orthoptera of New England, 1888.

McNeill, Jerome—"A List of the Orthoptera of Illinois" in Psyche, April and May, 1891.

Scudder, S. H.—Boston Journal of Natural History, VII., No. III., 1862.

Thomas, Cyrus H.—In "U. S. Geological Survey of Montana and Adjacent Territory," 1871.

ACRIDIDÆ.

ACRIDINÆ.

TRUXALINI.

1. LEPTYSMA MARGINICOLLIS, Serville.

Opomala marginicollis, Thomas, Syn. Acrid. N. A., 1873, 66, 196, 250 (note).

Leptysma marginicollis, Scudder, Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 87.

Leptysma marginicolle, Comstock, Introduction to Entomology, I., 1888, 111, fig. 102.

On October 11th, and again on the 24th, a number of specimens of this slender-bodied, graceful species were taken from the tall sedges and rushes which grew near the margin of a large pond in the river bottom of the southern part of Vigo Co. Its range has heretofore been supposed to be a strictly southern one, and Thomas, in the note, loc. cit., states

that it is doubtful if it really belongs to the U. S. fauna. Mr. S. H. Scudder has, however, since recorded it from Florida, and in a personal letter says that it has also been taken in North Carolina, but not farther north.

Its occurrence in numbers as far north as Central Indiana is therefore worthy of record, and can only be accounted for by the presence of the broad and sheltering valley of the Wabash, within the confines of which it finds a climate and vegetation congenial to its taste.

If its habits be the same elsewhere as in Indiana, the name "grass-hopper" is for it a misnomer, for here it is never seen on the grass or ground, and never hops when disturbed, but moves with a quick and noiseless flight for twenty or more feet, to a stem of sedge or rush, on which it alights. The instant it grasps the stem it dodges quickly around to the side opposite the intruder. Then, holding the stem firmly with its short front and middle legs, it draws its slender hind femora close up against the body, and folding the tibiae into position, hugs its support as closely as possible, and remains perfectly motionless. Its body is almost cylindrical, and being of the same general colour as the stalk of the plant on which it rests, it is almost impossible to detect it, unless one sees exactly where it alights. Eight times out of ten a person by approaching quietly can reach his hand about the plant stem and grasp the insect. Its habits excellently illustrate the so-called "protective mimicry" of form and colouring, as it always seems to choose a cylindrical object, and one similar to its own colour before alighting.

As the description given by Thomas, loc. cit., is the only one in American works of reference, and, moreover, is a very short and poor one, I append the following drawn from fresh specimens, and hope that collectors throughout the Northern States will be on the lookout for this interesting and peculiar species:—

Body very slender, sub-cylindrical. Antennæ short, somewhat ensiform. Vertex extending far forward in the form of an equilateral triangle, slightly sulcate on its anterior half. Face very oblique, median carina weak, narrowly sulcate for its entire length; lateral carinæ slight and straight. Pronotum almost cylindrical, slightly divergent on posterior half; median carina present, distinct only on posterior lobe; lateral carinæ obsolete. Prosternal spine short and rounded. Face, vertex, occiput, and disk and sides of pronotum densely punctured. Tegmina exceeding the abdomen by 3 to 5 mm. Wings equal to tegmina in male, slightly shorter in female. Posterior femora very slender, not reaching tip of abdomen. Anal cerci of male slender, tapering, and bent abruptly upward and forward near the base. Sub anal plate narrow, upturned and tapering to a point.

The ground colour is a fawn, unbroken except by a narrow, yellowish stripe, extending from the hind border of eye, along the lower edge of pronotum to coxa of hind

leg. In living specimens this line is bordered above by one of dark brown. When the insect is dried the brown fades and the tips of tegmina become darker. Length of body to tip of tegmina, male, 30 mm.; female, 37 mm., of antennæ, male, 8 mm.; female, 6 mm.; of tegmina, male, 20 mm., female, 26 mm.; of posterior femora, male, 14 mm., female, 17.5 mm.

OEDIPODINI.

2. SPHARAGEMON BOLLI, Scudder.

Spharagemon bolli, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII.,
1875, 469.

McNeill, "Orthop. of Ill.," Psyche, VI., 1891,
64.

Dissosteira bolli, Fern., Orth. of N. Eng., 1888, 43.

This species is much less common than *S. balteatum*, Scudd., but three specimens having been secured. It may be readily known from *balteatum* by the higher crest of the pronotum, by the general colour being darker, the bands across the tegmina more distinct, and by having the tip of wing as black as the median arcuate band. It frequents high, dry woods, and moves with a quick, almost noiseless flight, but is clumsy as a hopper.

Sept. 1st, Oct. 17th, in copulation.

ACRIDINI.

3. MELANOPLUS GRISEUS, Thomas.

Caloptenus griseus, Thos., Geol. Surv. Terr., 1871, 454.

Id., Syn. Acrid. N. A., 1873, 165.

A single ♂ of this handsome *Melanoplus* was taken in Putnam County, on August 25th. It hopped across a roadway in the woods in company with numerous specimens of *M. femur-rubrum*, and was at once detected on account of its peculiar coloration.

On October 17th, a ♂ and ♀ were taken from near the base of trees in a high woodland pasture in Vigo County, and again on November 15th a single female was found in a similar locality.

These four are all that I have ever seen. No one of them took to flight, and their movements on the ground were exceedingly clumsy, they being easily captured with the hand. As Thomas, loc. cit., described the species from a single ♀ taken in Ohio, and as I can find no reference to the species other than those cited above, I add the following description of the ♂, drawn from a fresh specimen, together with accurate measurements of both sexes.

The length of *M. femur-rubrum* but thicker bodied. Head rather large with the occiput elevated; eyes prominent. Vertex very narrow between the eyes; the fastigium deeply sulcate; foveola present but minute, their outline circular. Frontal ridge rather broad, sulcate at the ocellus, convex between the antennæ, punctate with black depressions along each margin for its full length. Lateral carinæ prominent, but little divergent. Pronotum nearly uniform in width, expanding slightly posteriorly; the median carina distinct only on the posterior lobe, and deeply cut by the three transverse sulci; posterior lobe punctate with dark impressions. Tegmina extending 5 mm. beyond the tip of abdomen; wings but little shorter. The terminal ventral segment turned up, narrow, acuminate, entire. The anal cerci are strongly bent upward near their middle, and bear on their lower edge a broad, triangular, wing-like expansion, the apex of which is opposite the bend.

Colour.—Face, occiput, and disk of pronotum a grayish-lilac with numerous fleckings of sooty black. A broad stripe of black starts from the eye and extends back along the upper side of pronotum to the posterior transverse sulcus. Tegmina grayish-olive, marked regularly over almost their entire surface with subquadrate fuscous spots which are much larger than those possessed by *femur-rubrum*. Wings transparent, tinged with pale yellow on basal third, the veins of apical fourth fuliginous. Three bands of black cross each femur and are alternated with bands of grayish-blue of the same width. Posterior tibiæ with the basal third red, the remainder gray with black spines, knees black; venter pale yellow, (alcohol changes the black to a reddish-brown, and the grayish hues to a dull yellow). Dimensions:—Length of body, ♂ 24 mm., ♀ 27 mm.; of tegmina, ♂ 20 mm., ♀ 22 mm.; of antennæ, ♂ 11 mm., ♀ 12 mm.; of posterior femora, ♂ 14 mm., ♀ 15 mm.

The peculiar mottled appearance, and the broad expansion of the anal cerci of the ♂, serve to distinguish this species from all other *Melanopli* of the E. U. S.

4. PEZOTETTIX HOOSIERI, nov. sp.

Antennæ of ♂ very long, exceeding the length of posterior femora. Vertex between the eyes narrow, scarcely as broad as the basal joint of antennæ, (broader in the ♀), expanding and prominent in front of the eyes where it is broadly but shallowly sulcate; foveola about twice as long as wide, slightly narrowed in front, more prominent in the ♀. Frontal ridge rather broad, regular, scarcely if at all sulcate below the ocellus;

lateral carinæ well developed, but little divergent. Pronotum broadening, slightly on posterior half, (more noticeable in the ♀); median carina distinct and equal throughout, the transverse sulci scarcely noticeable in the ♀, distinct but shallow in the ♂; the lateral carinæ present but rounded obtusely off; the disk and sides of posterior lobe densely and rather coarsely punctate. Tegmina oblong, two and a-half times as long as broad, reaching to middle of abdomen and slightly overlapping on the median dorsal line, the wings but little shorter. Last ventral segment of the abdomen of ♂ broader than high, tumid posteriorly, the lateral edges higher and flaring slightly outwards. Cerci long and slender, gently incurved, narrowed at the middle, with the apical third flattened and slightly hollowed on the exterior face.

Colour of living specimens:—Male—Antennæ rufous, infuscated at tip, and with the apical sixth of each segment yellowish. Face green, clypeus and mouth parts yellow. Vertex, disk of pronotum and tegmina plain olive, immaculate. Lateral lobes of pronotum greenish-yellow below; above with a broad, shining, black line reaching from the eye to their posterior edge. The venter pale yellow, and the meta-pleural episterna with an oblique yellow line. Femora green; knees black; posterior tibiæ greenish, rufous at base, with black spines.

Female—Duller; the disk of pronotum and tegmina sometimes with minute fuscous spots; a black stripe on the sides of abdomen, above which are numerous small black blotches.

Measurements:—Length of body, ♂ 22 mm., ♀ 31 mm.; of antennæ, ♂ 15 mm., ♀ 11 mm.; of tegmina, ♂ 10 mm., ♀ 13 mm.; of hind femora, ♂ 14 mm., ♀ 17.5 mm. 13 ♂'s, 11 ♀'s.

About the margin of the pond above mentioned, this *Pezotettix* was found in numbers on October 17th. It was at once noticeable on account of the length of the male antennæ, and the black stripes on the sides of the abdomen of the female. The pond was almost dry, and the dense growth of sedges and rushes which had filled its shallow margins, were, in some places, burned away. Over the burned spots had sprung up a dense green vegetation, and here this *Pezotettix* flourished in company with *Truxalis brevicornis* and *Chrysochraon viridis*, while a few feet away *Leptysmia marginicollis* found a suitable home amongst the rushes and sedges still standing.

Both sexes of *P. hoosieri* were very active, leaping vigorously when approached, and difficult to capture except by throwing the net over

them as they rested on the ground. The females were exceedingly difficult to kill in the cyanide bottle, "coming to" after having been kept in it for several hours, although the males and the other insects above mentioned were killed in a few minutes. On Oct. 27th the spot was again visited, and, although several heavy frosts had occurred, yet the species was still fairly common. At this time, however, they were all found in the small patches of grass which grew among the fallen leaves a few yards from the edges of the pond proper.

TETTIGINÆ.

5. *BATRACHIDEA CARINATA*, Scudder.

Batrachidea carinata, Scudd, Bost. Jour. Nat. Hist., VII., 1862, 479.

Thos. Syn. Acrid. N. A., 1873, 190.

Fernald, Orth. N. E., 1888, 49.

Tettix cristatus, McNeill, Psyche, May, 1891, 77.

Two males of this species were taken, in company with numerous young and adults of *B. cristata*, Harris, from a grassy hillside on April 1st, 1891. Although Bolivar, according to McNeill, has made *carinata* a synonym of *cristata*, yet, in my opinion, the two are as distinct as are the two common species of *Tettigidea*. *Carinata* has the pronotum extending 3 mm., and the wings 4 mm. beyond the tip of abdomen, whereas *cristata* has the pronotum of the same length as the abdomen and the wings lacking 2 mm. of reaching its tip. Moreover, the median crest of the pronotum is not so prominent nor so strongly arched in *carinata* as in *cristata*. Length of pronotum of *cristata*, ♂ 7 mm.; *carinata*, ♂ 9.5 mm. *Carinata* has not before been reported west of New Jersey.

6. *TETRIX CUCULLATUS*, Burm.

Tettix cucullata, Scudd., Bost. Jour. Nat. Hist., VII., 1862, 475.

Thos., Syn. Acrid. N. A., 1873, 185.

Tettix cucullatus, Fernald, Orth. N. E., 1888, 47.

McNeill, Psyche, VI., 1891, 77.

Several half-grown young and two adults of this species were taken on April 1st, and on Sept. 15th a large number of adults were secured. It appears to be widely distributed over the Eastern U. S., its occurrence having been observed from New England to Sherman, Texas, at which latter locality I took a number of specimens on July 11th. It is evidently a water-loving species, as those taken in Texas, and most of those secured

in Indiana, were found along the damp, sandy or muddy margins of small streams, in company with *Galgulus oculus*, a common Hemipteron, which abounds in like situations. *Cucullatus*, when disturbed, has a more prolonged flight than any other of our *Tettiginæ*.

The life-history of the "grouse locusts" is, as yet, very imperfectly known. In the proper localities mature specimens of most of the six species so far noted in Indiana can be taken almost any day in the year. *Tettix ornata*, Say, and *Tettigidea polymorpha*, Burm, were found in copulation on April 18th, and the latter species again on May 31st; while, as noted above, the half-grown young of two species were collected on April 1st.

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No. 18, *Pezotettix viridipes?* Walsh, Mss., of my first paper, is *Pezotettix viridulus*, Walsh, as I have since determined by comparison with specimens of the latter taken by Prof. McNeill at Moline, Ill. It was the third full-grown species, other than *Tettiginæ* taken last season, having been preceded by *Chortophaga viridifasciata*, De Geer, Apr. 26th, and *Arphia sulphureus*, Fab., May 20th. Two mature males of *P. viridulus* were taken on May 30th, and others were found at intervals throughout June, but it is by no means a common species in this locality.

FURTHER NOTES ON GELECHIA GALLÆDIPLOPAPPI, AND DESCRIPTION OF A NEW SPECIES OF BRACON.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In a paper entitled "A Day in the Woods," I brought under the notice of the Entomological Society of Ontario, at its annual meeting held in London, on the 27th of August, 1890, the galls formed by *G. gallædiploppapi*, and gave an account of the chrysalis and perfect insect. I also alluded to two kinds of parasites preying upon the species. The description of the moth was reproduced in the December number of the CANADIAN ENTOMOLOGIST of that year (Vol. XXII., p. 248).

The insect has again come under my observation, and I am able to furnish these further particulars concerning it:—

The larva of the species when full grown is four lines in length. Its colour is light seal-brown, and it has a dorsal line of darker brown, and a few dark patches on the three last segments. Its head is black. There are a few bristles on the head and along the sides. It assumes the chrysalis form in the beginning of July.

The moths continue to appear from the 1st of August to the close of the month.

At least three kinds of parasites molest the species :—

1. *Pimpla pterelis*, Say, which, in August, issues in its perfect state from the chrysalis of the moth. (See 22nd Ann. Rep., Ent. Soc. of Ont., p. 18). This species was identified for me by Mr. Harrington.

2. An insect which, in its larval condition, leaves the chrysalis of the moth about the 10th of July. The larva is nearly four lines in length, and is white with a tinge of pink. It spins a white cocoon within the gall. I have two or three of the cocoons, and hope to obtain the perfect insects in due course.

3. A Bracon.—The larvæ of this, numbering from four to ten in a batch, consume the remains of their host at the end of July, and then spin their light drab cocoons in a cluster at the bottom of the gall. The flies appear about the 10th of April.

The perfect insect has the head and thorax black. The abdomen, which is somewhat spindle-shaped, and is attenuated at the junction with the thorax, is honey-yellow, with a brown patch on the upper part of each segment—in some instances the upper part of each segment is entirely suffused with brown. The mouth organs are honey-yellow, and the legs, with the exception of the tarsi of the hindmost pair, which are light brown, are of the same colour. The ovipositor of the female is longer than the abdomen. Its sheath is blunt, hairy and black at the tip, and does not divide in drying.

I cannot learn that this insect has hitherto been described or named. I would therefore suggest for it the appellation *Bracon furtivus*.

NOTES ON THE LIFE-HISTORY OF AGALLIA SANGUINOLENTA, PROV.*

BY HERBERT OSBORN AND H. A. GOSSARD, AMES, IOWA.

This leaf-hopper is considered a clover pest, but is also known to feed on beets, rutabagas, cabbages and blue grass. It is active even in midwinter on sunshiny days. The eggs are thrust beneath the epidermis of the food-plant, and the first brood of larvæ appears from the middle of May until July 1st. The earliest individuals of the brood are nearly mature by the first of July and are supposed to begin egg-laying a little later. Larvæ can be found in all stages of growth from this time until the advent of winter, but most of the individuals are believed to be included in two broods.

ON THE ORTHOPTEROUS FAUNA OF IOWA.*

BY HERBERT OSBORN, AMES, IOWA.

The Preliminary List of the Orthoptera of Iowa, published by Prof. C. E. Bessey in the Seventh Biennial Report of the Iowa Agricultural College, is revised, a number of species being added and a number of names taken from incorrectly determined specimens rectified.

The revised list is represented thus in the following families :—

	Family <i>Forficulidæ</i> .
One species.	
	Family <i>Blattidæ</i> .
Four species.	
	Family <i>Phasmidæ</i> .
One species.	
	Family <i>Acrididæ</i> .
Forty-one species.	
	Family <i>Locustidæ</i> .
Twenty-three species, probably twenty-four.	
	Family <i>Gryllidæ</i> .
Ten species.	
Total, eighty or eighty-one species.	

HOW THE FEMALE OF *CACOECIA SEMIFERANA* PROTECTS HER EGG-CLUSTERS.*

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

The Box Elder Leafroller, *Cacoecia semiferrana*, was very abundant in many places in Colorado last summer, and in July the moths were swarming in the trees in the evening, presumably to deposit their eggs. The eggs were found beneath a gluey mass, somewhat similar to that used by the tent caterpillar in protecting her eggs, but it was largely covered with what appeared to be scales from the moth, placed like the shingles on a roof. A careful examination of these shingled patches under the microscope makes it seem certain that the eggs are first all deposited, the glue is then added, and after this the abdomen is laid at full length in the sticky substance until it hardens, when the abdomen is removed, and the scales covering its under side are drawn and left covering the eggs.

*Abstracts of entomological papers read before the Iowa Academy of the Sciences, Des Moines, Iowa, December 28 and 29, 1891.

NOTES ON COLEOPTERA.—No. 9.

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

Philydrus, CAN. ENT., XVI., 186.—The paragraph commencing with "*Philydrus*" should be corrected as follows:—*Philydrus perplexus*, Lec., and *P. Hamiltoni*, Horn, are found [on Brigantine Beach] in the fresh water pools which form at the base of the sand-hills, with *Hydrophilus glaber* and *Copelatus glyphicus*; while *Philydrus reflexipennis* occurs in the salt marshes under pieces of wood and recent tide-drift, seeming to inhabit salt or very brackish water, as it has not been taken in fresh water with the species mentioned. When the paragraph was penned *P. Hamiltoni*, since described, was supposed to be *reflexipennis*, and the true *reflexipennis* a variety of *ochraceus*.

Philydrus fimbriatus, CAN. ENT., XX., 63.—The variety noticed as inhabiting hill and mountain rivulets has recently been described as a species, and is *Cymbiodyta Blanchardi*, Horn.

Cercyon littoralis, Gyll.—This nice species occurred very abundantly in September at Longport, near Atlantic City, New Jersey. It inhabits under the softer grass washed from the Bay deposited on sand flats, and which has remained there long enough for breeding purposes. Though represented as very variable in colour and markings, the only differences observed in several hundred individuals examined was that about one-half were entirely piceous black, while the remainder had the posterior fourth of the elytra pallid. *Cercyon* has heretofore been much neglected by most American collectors, but the genus having been recently monographed by an able hand, and the species defined by characters usually of easy observation, they are likely to become better known. All things considered, this species seems to be native in North America as well as in Europe. Here it has been taken on Magdalen Island, Gulf of St. Lawrence; Coney Island, New York; the New Jersey sea coast, and in Illinois (Horn, monograph). In Europe, skirting the Western Mediterranean shores, it follows the Atlantic Coast to N. Lat. 66° 50', and also occurs in Northern Asia on the shores of the Obi. The *Cercyons*, so far from being despicable, are very interesting beetles, and no genus of equal extent contains so many forms common to the Old and New Worlds. In fact, of the 25 American species monographed by Dr. Horn, 14 likewise occur in Europe.

Trogophloeus convexulus, Lec. — Several examples (it occurred abundantly) of this minute beetle were taken on the salt marshes near

Longport, New Jersey, in September. The identification is due to Mr. H. Ulke, confirmatory of a like diagnosis by myself. The most, or indeed all of the species of *Trogophloeus* which I have heretofore taken, occur wandering about in very wet places, taking refuge under leaves, sticks, &c.; but the present species differs in being found in places comparatively dry, and in constructing surface galleries like many of the species of *Bledius*, some of which it closely resembles. Dr. Leconte described the species from an individual from New York, and another from Kansas, which, till the present time, do not appear to have been duplicated. These two examples, measuring each .07 inch in length, represent the smallest individuals; the length of a number taken together averaging over .09 inch. There are no thoracic impressions whatever visible in the great majority of individuals, but occasionally one of the larger ones bears indistinct traces of the usual basal marks, barely discernible in certain lights. The smooth thoracic line is usually conspicuous, which, with the piceous or black antennæ and parti-coloured feet, make this species of easy recognition. This species likewise occurred on Brigantine Beach, and may be looked for in the salt marshes anywhere along the Atlantic Coast.

Callichroma splendidum, Lec.—This well-known and highly-prized beetle is distributed along the Atlantic coast from Delaware to Key West, Florida, around the Gulf of Mexico to Southwestern Texas, and northward along the Mississippi to Arkansas. It is known to breed in the trunk and immense roots of a tree growing in the Southern swamps, especially in such as sustain Cypress, and is known in different places by such names as Sour Tupelo, Large Tupelo, Wild Olive, Wild Lime, Gum-Elastic Tree, &c., being the *Nyssa uniflora*, Walt., congeneric with *N. multiflora*, Weng., the abundant and well-known Gum Tree, or Pepperidge, common in many of the Northern States. The leaves and fruit of this tree, with several of its brilliant inhabitants, were recently received from Alabama, by which I am able to confirm the one or two observed records of its larval habits. It may, however, breed in other species of trees, as the first example in my collection was presented by a young naval surgeon, who took it on Key West, Florida, a place where *Nyssa* probably does not grow. The individuals of this species vary considerably in size, the sculpture of the thorax, and the colour of the elytra. An individual from Delaware measures .85 inch in length; the one from Key West and another from Texas 1.70 inch each, but the average

appears to be near 1.30 inch. The colour of the thorax is uniformly a brilliant fiery copper, with green reflections when seen after night or in certain lights, and is a specific character; the thorax differs in individuals from being deeply rugose to comparatively smooth, and in the prominence of the lateral spines and tuberosities. The elytra in the large majority are deep sericeous green, but in some examples, more or less shot with copper, which in some individuals becomes the prevailing colour, known in some collections as *virescens*.

Some time ago I had an opportunity to examine several examples of each of two species of *Callichroma* taken in Cuba, one of which, labelled *columbina*, Dej., seems only to differ from *splendidum* by having the thorax colored coppery bluish or violet; if other differences exist they escaped observation.

This species was described very briefly by Dr. Leconte under Dejean's catalogue name *splendidum*, with *Cerambyx elegans*, Fab., Oliv., Hald., in synonymy (Jour. Acad. Nat. Sci., Phil., 2d Ser., II., 37). Dr. Asa Fitch, however, states (Rep. 4, 711,) that Linnæus had previously described it under the name *suaveolens*, from an example sent him from Carolina by Dr. Garden. (Appendix to last Ed. Syst. Nat., III., 224, 1770.) At one time this species was considered an inhabitant of the West India Islands, being probably mistaken for *columbina* or some allied species. In fact, some of the species of *Callichroma*, of which I have seen nine, are uncomfortably close, and separated by characters which, in many genera, are of little moment.

C. plicatum, Lec., is strikingly like *splendidum*, but the green colour of the head and thorax is constant and devoid of any coppery reflections. The habits of the two species, if I am rightly informed, are more confirmatory of their being specifically different than anything yet observed in their external structural characters. A friend (not an entomologist), from Hamilton County, Central Texas, says this species breeds in old cactus. While requiring further confirmation, this statement is probably correct, from the fact that there has been no record observed of its having been taken in swamps with *splendidum*, and from the fact that it occurs only in cactus regions in Texas to Arizona, where it was taken near the southeastern boundary at Camp Bowie. (Wheeler's Reports on Exp. and Surv., Vol. V., Zoology, p. 821.)

Eupogonius tomentosus, Hald.—Here this species is not common;

till recently all the examples in my collection were bred from dead hickory limbs (once). All other observed records of its habits represent it as inhabiting in its early stages pines. This is with scarcely a doubt the species Dr. Fitch describes under the name "*E. pinivora*, Pine-eating Gay-beard" (Rep. iv., 712), which he says differs from *E. tomentosus* by the erect hairs on the body and antennæ being black, a different form of spots on the elytra and the smaller size. The last two are of no value, as the length of *tomentosus* varies from .20 inch to .33 inch, and the elytra from having scarcely perceptible patches of pubescence to the high ornamentation of Dr. Fitch's *pinivora*, while the black colour of the erect hairs was very probably an optical deception, from a perhaps careless comparison of bright fresh examples with older faded ones; any one who has the insect can readily see how this might occur, by examining a specimen after night, or by a dull light. This species is distributed from Florida to Canada, occurring in New York and Michigan. The locality from which the hickory limbs from which my examples were bred were obtained is remote from any place growing pine, and the occurrence can scarcely be regarded as fortuitous. *E. vestitus* is very commonly bred here from hickory.

Elleschus, CAN. ENT., XVI., 106.—The *Elleschus bipunctatus*, mentioned at the place cited, proves to be one of the forms of *E. scanicus*, Payk., as determined by Dr. W. G. Dietz on comparison with authenticated European examples. The colour and the elytral markings of this species seem to be locally variable, and in the present instance scarcely or not differing from those of *bipunctatus*. This form has been sent me from Europe as *bipunctatus*, but an examination of the structural characters shows it to be the same as my American form. The typical form of Paykull was rufo-testaceous with fasciate elytra, and a similar form was taken by Dr. Dietz at Hazleton, Pennsylvania, from which a redescription of the species was made and a figure drawn (Tr. Am. Ent. Soc., 18, 264, plate vii., fig. 35, 35a). As he had not then seen this form it is not mentioned in Dr. Dietz's excellent paper, and from his description and figure of the species it would not be readily recognized as the same. Some individuals have no markings whatever, not even a trace, and all others have, more or less visible, the small spot on the disk of the elytra before mentioned, any others being attributable to abrasion. The colour varies from piceous to pale. This species is only known from here, and at Hazleton certainly. Common throughout Europe on willow.

Dr. Dietz records *E. bipunctatus* as occurring in Canada; Hubbard and Schwarz, in Northern Michigan.

Anthonomus musculus, Say, and *A. signatus*, Say.—In 1831 Say published in his *Curculio*, p. 15, a description of *A. musculus*, and on p. 25 that of *A. signatus*, and from the descriptions it is evident he had before him two distinct species. In Leconte and Horn's *Rhynchophora*, a species is assigned to each name separated by definite characters; and in Dr. W. G. Dietz's elaborate revision of the tribe lately published, these are still more clearly defined. One of these species is of economic importance, being occasionally exceedingly destructive to the cultivated strawberry. Owing to the difficulties encountered in attempting to separate them, some economic entomologists now solve the matter by uniting the species, unfortunately, under the name of the one having typographical precedence—*musculus*. Prof. C. V. Riley devotes several pages in one of the Government agricultural reports (1885, p. 276–282,) to the discussion.

The true *musculus* is not very common here, and is usually found in colonies on huckleberry blossoms—I have never taken a specimen on anything else—and occurs here from the middle of May till the first of June. Whole acres may be hunted over without obtaining a single specimen. The individuals seem to vary only from degrees of maturity, Say's description having been drawn from examples recently disclosed, while his variety is the more mature. *A. signatus*, on the other hand, is protean in colour and elytral ornamentation, so much so that judged by this alone it might be divided into several species. It appears about the first of June, and may be found more or less abundantly all summer. It eats the leaves and blossoms of many species of trees and shrubs. I have taken it abundantly on *Tilea* and *Rhus*, and it seems to have a decided taste for certain *Rosaceæ*—notably, *Rubus*.

Diligent search has several times been made in the fields of the cultivated strawberry without finding any *Anthonomus*, and efforts to obtain the strawberry form from correspondents have equally failed. *A. signatus*, however, is often seen on the leaves of the wild strawberry, through which it eats holes like it does to the leaves of *Rubus*. Both species may possibly depredate in strawberry plantations, but it would be a wide departure for the true *musculus* from any of its known habits.

From the unanimity of systematists in maintaining the distinctness of the species, it will be necessary for economic entomologists, if they care

for accuracy, to make further investigation and ascertain which it is by which the mischief is done, or whether both species may not be concerned in different places. There will be little trouble in doing this, provided the huckleberry insect can be found with which to make the comparison, as they are only moderately difficult to separate when both forms are at hand.

NOTES ON THE ÆGERIADÆ OF CENTRAL OHIO.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The Lepidopterous family to which these notes pertain is a homogeneous and distinct one, clearly and sufficiently separated from other families. The larvæ, so far as known, are borers in roots, stems, branches, or excrescences of trees, shrubs or annuals, yet all strictly retain the structure and appearance of the young of their order. Most of them pass the winter buried in the food plant. A few, however, hibernate as pupæ or as larvæ, protected by cocoons. The most remarkable variation of the adolescent period is in the variable length of time from egg to pupa. Certain wood-boring species, *Harmonia pini* for example, pupate and disclose the imago the third year from the egg; others complete their changes in a few weeks. The pupæ are quite similar. The clypeus is usually armed with a protuberance, and the abdominal rings with transverse rows of spines, agreeing in this respect with normal pupæ of Tortricidæ, Cossidæ and Hepialidæ.

The moths are among the most beautiful of insects, and in other ways they are no less attractive. Their exquisite form, coloration and gracefulness of motion appeal to every one permitted to see them, but the highest enjoyment is reserved for those who appreciate the extent and exactness of *protective mimicry* exhibited by these insects. So intimately do they simulate the appearance, aided many times by sounds, odours and attitudes of wasps and bees, that the very elect in entomology are often deceived and cheated. Again, their habits render many of them grave pests, compelling attention from horticulturist and economic entomologist.

In spite of these reasons, and more that might be alleged for their collection and study, they are not well represented in collections. In fact, in a majority of collections which I have had the pleasure to examine Ægeriadæ, like Odonata, are few and ill-favoured. This is to be regretted; but since we have the material in abundance, the defects may

and will be remedied. The situation is relieved somewhat by the thought that there is certainly one unique collection of the *Ægerians* in this country, namely, that of the late Henry Edwards. What disposition is to be made of it I know not. Perhaps no one does. All sincerely hope that it may speedily find a safe resting-place, accessible to the interested student, and where it will be properly cared for, and will duly honour our foremost student of this group.

The list of species of this family thus far collected at Columbus, I am aware, is only a partial one—one which it is hoped may be greatly increased in the near future. Such facts as are at hand, it is hoped, will prove interesting and suggestive. I follow the generic arrangement of Henry Edwards in Grote's Check List of N. A. Lepidoptera.

Melittia ceto, West., (*cucurbitæ*, Harris).—The squash-borer occurs abundantly in Central Ohio, and, indeed, throughout the State. In localities where cucurbitaceous plants are cultivated on a commercial scale it is a veritable pest. Is it double brooded? Since Dr. Harris's account of its habits more than sixty years ago, it has been regarded as single brooded, the moth appearing in early summer, the mature larva entering the soil in July and August, enclosing itself in a gummy cocoon in which it remains until the following spring, when it completes its transformations. During the last days of August Prof. F. M. Webster and myself found in squash vines on the Ohio Agricultural Experiment Station Farm larvæ of different sizes; a few inches below the surface cocoons containing larvæ were found, and one fresh imago was taken resting on the leaves. By September 20 all the larvæ were out of the stems and could be found in their dark, oblong cocoons from two to four inches beneath the surface. My friend Webster asked me if the species was two-brooded. I replied by asking him the same question. At the time I did not recall the paper by Prof. S. H. Scudder in *Psyche*, vol. iv., p. 303, in which he recounts finding in squash vines on Cape Cod in September two larvæ, one much larger than the other and apparently specifically distinct. He describes each and raises the question, Is *M. ceto* double brooded or are there two species passing under that name? Only the larger forms found by the writer were preserved and carefully examined; they were typical *Melittia ceto*. The single imago was likewise a typical example of that species. It seems probable from the facts at hand that in Central Ohio and South the species is double brooded.

Alcathoe caudatum, Harris.—This unique species is the sole representative of its genus. It was described by Harris in vol. xxxvi. of Silliman's Journal. His description has been copied by many authors and nothing added. This is evidently due to the fact that the insect is rare. A number of working entomologists have assured me that they had never taken it. The latter part of August, 1889, three examples were seen by me visiting blossoms of *Mileolotus* on the Ohio State University grounds; two males were captured, the third, a female, escaped.

Harris describes the forewings of the male as "transparent from the base to the middle." In both of my specimens there are only clear streaks, one on either side of the median vein; indeed, when first taken these lines were scarcely perceptible. The coxæ and femora are black; tibiæ orange, with more or less perfect black rings at base and apex of second and third; tarsi tawny orange, with first joint of last pair surrounded by a heavy band of orange hairs and a few black ones outwardly at the base; the palpi are light, bright orange below, darker above, whilst the antennæ are of the same shade as the upper surface of the palpi, but having the double row of fringes blackish. The caudal appendage, which is fully as long as the abdomen, is bright orange; the caudal tufts are black and orange. Harris gave the black currant as the larval food-plant. Henry Edwards, in Transformations of N. A. Lepidoptera, mentions the stems of *Clematis* also. I have not been able to find the larva in either of these plants.

Bembecia marginata, Harris.—This species occurs everywhere about Columbus in the native blackberry. Thus far I have not heard that it has given trouble to the cultivator. The moths may be taken in September resting on the foliage of plants near the food of the larva.

Podosesia syringæ, Harris.—As the specific name implies the larval food-plant is the lilac. If it would confine its attention to this old-fashioned ornament of lawn and garden it would have far less economic interest. But, unfortunately, it attacks and destroys the white and the European ash, as well as the mountain ash, *Pyrus Americana*. Large numbers of them were found in the trunks of the last in April, 1891; several trees on the Ohio State University campus were found greatly damaged by them. It may, therefore, yet be found to injure other and more valuable rosaceous trees in cultivation.

Sannina exitiosa, Say.—The *Ægerian* peach-tree borer is far too abundant wherever the peach is cultivated. Central Ohio is not an exception.

Ageria gallivora, West.—In May last I obtained from a globular excrescence on an oak twig three *Agerians*—one male and two females. They were at first taken to be *Ageria hospes*, Walsh, until a careful comparison was made with the original description of that species in vol. vi., p. 270, of the Proceedings of the Entomological Society of Philadelphia, when I found good evidence that the moths were not of that species. The following characters seem to afford sufficient grounds for this conclusion:—1. They were larger, expanse .75 inch (*Hospes* .57 inch); 2. there is a well-marked black band at tip of hind tibiæ, in the female as wide as half the length of the joint, or the whole space distal of the middle spurs (*Hospes* has the tibiæ tipped with blackish only); 3. the second abdominal band of female is broad and the yellow ventral patch much longer and more clearly defined than in the male (according to Walsh, this band is not broad and the spot is only half as long as in the male); 4. the expanse of *Hospes* female is .50 inch, of these .75 inch; 5. and again, these have a yellow collar and the first joint of the antennæ maculate in both sexes, whilst the female *Hospes* has the first antennal joint immaculate (Walsh).

Are these moths Westwood's *Trochilium gallivora*? His description is inadequate, and without a comparison with the type there must always remain some uncertainty. Nevertheless, I refer my specimens to that species for the following reasons:—1. Westwood's specimens were bred from galls of *Quercus palustris* received from U. S. (*Papilio* II., p. 97). 2. The size is nearly the same (*Gallivora*, alar expanse 8 lines). 3. "*Legs yellow, with a dark ring around the tibiæ near the tips,*" characterizes this feature exactly, especially true of the hind tibiæ; the first and second pairs are yellow, with more or less blackish on the outside of the tibial extremities.

The sexes of what I take to be *Ageria gallivora* agree almost exactly in size and closely in ornamentation; the lower part of the front and a ring about the eyes milk white, above the white of the front shades into yellow, which extends about the first antennal joint, and is overhung by rather long blue black scales, concolorous with the ground colour of thorax and abdomen; the palpi are yellow, blackish above; and the abdominal bands are two in both sexes, narrow in the male, the first narrow and the second broad in the female.

Although my material is scanty, I have reached the following conclusions regarding these gall-feeding and evidently inquiline species from

oak and hickory: *Hospes* is a good species, but what Walsh has said about the supposed female pertains to a species as yet unnamed; and *Gallivora* is now rescued from forgetfulness.

Egeria pictipes, G. & R.—This moth is quite abundant throughout this district, and does serious injury to wild and cultivated cherry, as well as the plum. I have seen at least a score of pupal skins protruding from one tree at the same time.

Egeria acerni, Clemens.—Great numbers of our maple shade trees are injured, often ruined, by this species. It is, however, rarely seen in the forest.

Egeria tipuliformis, L.—The imported currant-stem borer is said to occur in Central Ohio. I have not yet taken it.

Egeria lustrans, Grote.—I have two examples. The type was captured by G. R. Pilate near Dayton, O., and is said to be "common in one place." The food-plant is unknown.

Egeria corni, Hy. Edw.—A moth taken at Sugar Grove, O., July 3, 1891, visiting the blossoms of basswood, I refer, with some hesitation, to this species. It resembles *Acerni*, but is smaller, and in every way more delicate. The agreement with Mr. Edwards's description of *Corni* (*Papilio* 1, 190,) is close, except the blackish third article of the palpi is not mentioned, and the underside of the caudal tuft is reddish orange or tawny, and not "bright orange." The expanse is 18 mm. instead of 15 mm.

Carmenta pyralidiformis, Walker.—Rare at Dayton. See List of G. R. Pilate, *Papilio* II, 65.

Albuna modesta, n. sp. I propose this name for a species taken on the University campus at Columbus in August last, resting on foliage. I have compared it with all of Mr. Edwards's descriptions of species in *Egeria*, as well as *Albuna*, and examined as many of his types as I have been able to consult; also the species in the National Museum at Washington. I cannot recognize it among the descriptions or specimens.

The female has the head, thorax, abdomen and wings black above; the palpi are rather long, sordid white below and inwardly, blackish above and outwardly; the eyes are bordered by pale yellow scales; the antennæ are black, with a white patch on the upper posterior surface one-fourth the length from the tip; apical tufts black; thorax and abdomen without streaks or bands above, beneath both are paler, with a few yellow scales on the sides of the metathorax. The anterior vitreous space of

the fore-wings is small and triangular, the posterior one likewise small and oval; interveinular spaces of the apical patch golden; hind-wings with very narrow black border, fringes throughout blackish; beneath hind-wings as above, fore-wings yellow to the discal spot, with interveinular spaces beyond of the same hue. Fore-coxæ black, with pale scales, especially on lateral edges; femora black, with more or less pale; tibiæ black, with the spines and a few scales at tip sordid white; tarsi blackish, ringed with dull white; abdominal tufts slight, concolorous, with a few yellow points at base laterally.

Expanse, 18 mm.; length, 9 mm.

I have referred the moth to *Albuna* rather than *Ægeria* for the following reasons: 1, "the head is narrower than the thorax, which is not produced far beyond the base of the wings;" 2, "the antennæ are comparatively short," not reaching to the discal spot; 3, the legs are relatively short, on the other hand the tibiæ are not more than usually clothed with scales; 4, "the markings of the wings are heavy, the space between the submedian nervure and the inner margin is clothed with scales," except a minute clear space proximate of the clear triangle, and within the submedian; 5, the abdomen is fusiform without the apical brush.

The finding of the male may make the generic reference more certain.

BOOK NOTICE.

List of Lepidoptera of Boreal America, by John B. Smith, Sc. D., etc., Philadelphia, American Entomological Society, 1891.

Prof. Smith divides the Lepidoptera into seven suborders:—(1) The Rhopalocera, containing four families; (2) the Heterocera, containing twenty-three families, and comprising the Sphingidæ, Ægeriadæ, Thyridæ, Zygaenidæ and Bombyces of Grote's list; (3) the Noctuidæ, containing three families; (4) the Geometrina, containing the single family Geometridæ, divided into nine subfamilies; (5) the Pyralidina, containing seven families; (6) the Tortricina, containing three families; (7) the Tineina, containing twenty families. Prof. Smith has been assisted by Dr. Skinner in the Rhopalocera, by Dr. Hulst in the Geometrina and Pyralidina, by Prof. Fernald in the Pyralidina and Tortricina, while the entire list of the Tineina is by Dr. Riley. The list contains 6020 numbered species, which includes the unidentified species described by Walker (243 in number) and other authors (in all, 79 names).

There are a few inaccuracies and omissions among the Bombyces, which I should like to notice:—

Family Nycteolidæ, page 23, add *Sarrothripa reveyana*, S. V. (See Hy. Edw., Bull. 35, U. S. Nat. Mus., p. 55).

Family Lithosiidæ, No. 966, *Nola minuscula*, Zeller, should have precedence as it was described in 1872 (Verh., d. k. k. Zool. Bot., Gesell. XXII., 455), while *fuscata*, Grt., was not described till 1881 (Papilio, I., 76).

Family Arctiidæ, p. 27, No. 1113a, *Arctia sciurus*. Bdv., is given as a variety of *Euchaetes collaris*. Mr. Hy. Edwards once stated to me that it was the same as his *E. yosemita*. This would be a more probable synonymy, *sciurus* having precedence.

Family Liparidæ, p. 28, No. 1166, Walker's *clandestina* was referred to *Gluphisia* by Mr. Grote (CAN. ENT., IX, 21), but I do not know it, and it may really be *Dasychira*.

Family Notodontidæ, p. 30, add *Gluphisia avimacula*, Hudson. No. 1277 is the same as No. 1285, *Pheosia dimidiata*, H.-S., and I am of the opinion that *P. rimosa* and *P. californica* are synonyms of this. (See Psyche, VI., 194.) No. 1289, *Edema albicosta* is given as a synonym of *E. albifrons*. The forms can be distinguished, and I am not aware that they have been proven varieties. Nos. 1300 and 1302 are better referred to *Schizura* in my opinion. (See Psyche, VI., 177.) Page 31, No. 1339 is probably a synonym of No. 1345. No. 1342a is not a variety of *Cerura occidentalis*, but of *C. cinerea*. Perhaps I am responsible for this error, as my table in CAN. ENT., XXIII., 87, may be a little ambiguous, for I placed the var. *cinereoides* before *cinerea* instead of after it on account of the arrangement of the table. No. 1343, *C. scitiscrupta* is given as a synonym of *C. cinerea*. This is surely a mistake. So far as I know it is a good species, and I have referred *candida*, Lint., as a variety of it, and not of *cinerea*, as it stands. *C. candida*, Lintn., has no affinity with *cinerea*, but the three forms, *scitiscrupta*, *candida* and *multiscrupta*, constitute a distinct group of the genus. Add *Cerura modesta*, Hudson.

Family Ceratocampidæ, p. 32, add *Dyocampa riversii*, Behr.

Family Bombycidæ, p. 33, *Hemileuca neumogeni*, Hy. Edw., seems to have been overlooked. No. 1351, *Clisiocampa strigosa*, Str., is a synonym of *C. constricta*, Str. *Gastropacha alescensis*, Pack., seems to be wanting. (See Stretch, Zyg. and Bomb., N. A., p. 113.) No. 1419½ should be *Thauma ribis*, to keep the original orthography. (See Hy. Edw., Proc. Cal., Acad. Sci., V., 265.) And, finally, *Eutheca mora*, Grote, has been left out. (See Bull., U. S. Geol. and Geog. Sur. Terr., Hayden, VI., 257.)

The list will be the standard for some time to come, and should be in the possession of every entomologist.

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