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The Canadian Entomologist.

VOL. IX.

LONDON, ONT., SEPTEMBER, 1877.

No. 9

A NEW LEPIDOPTEROUS INSECT INJURIOUS TO VEGETATION.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

(Read before the Am. Asso. Adv. Sci., August 30, 1877.)

In the months of June and July the Red Pine (*Pinus resinosa*) and the White Pine (*Pinus strobus*) show by the exuding pitch that they are suffering from the attacks of an insect. The wounds occur on the main stem below the insertion of the branch. On cutting into the bark the injury is found to be caused by a small larva, which, when full grown, measures 16 to 18 millimetres. The head is shining chestnut brown with black mandibles. The body is livid or blackish green, naked, with series of black dots, each dot giving rise to a single, rather stout, bristle. The prothoracic shield is blackish. The larva has three pair of thoracic or true jointed feet, and four abdominal or false feet, besides anal claspers. This larva, eating on the inner side of the bark, and making furrows in the wood, causes the bleeding which, when the depletion is excessive or continuous, and especially in the case of young trees, has proved fatal.

In July the worm spins a whitish, thin, papery cocoon in the mass of exuding pitch, which seems to act as a protection to both the larva and the chrysalis. The chrysalis contained in the cocoon is cylindrical, smooth, narrow, blackish-brown, about 16 millimeters in length. The head is pointed, there being a pronounced clypeal protuberance; the segments are unarmed; the anal plate is provided with a row of four spines, and two others, more slender, on either side of the mesial line, below the first. It gives the moth in ten to fourteen days. The perfect

insect expands on an average 30 millimeters. An examination of the veins of the wing shows that vein 7 of the primaries is wanting, while vein 1 is simple. On the hind wing the cell is closed or very nearly so. It belongs thus to the *Phycidae*, a sub-family of the *Pyratidae*. The male antennæ are bent a little at the base, the joints inconspicuous; the maxillary palpi in the same sex are not brush-like, and the hind wings are 8 and not 7 veined. We may refer the moth, then, to the genus *Nephopteryx*. Veins 3, 4 and 5 spring nearly together from the outer extremity of cell of the hind wings (though 5 seems to be nearly independent while running close to 4); vein 2 is not far removed from 3. On the primaries veins 4 and 5 spring from a common stalk, so that we must refer the moth to the sub-genus *Diorystria* of Zeller. In color the moth is blackish gray, shaded with reddish on the basal and terminal fields of the fore wings. There are patches or lines of raised scales on the basal field and on the anterior and darker portion of the medium space. The median lines are prominent, consisting of double black lines enclosing pale bands. The inner line at basal third is perpendicular, W-shaped or dentate. The outer line at apical fourth is once more strongly indented below costa. The black component lines do not seem to be more distinct on one side than on the other of the pale included bands or spaces. The median field is blackish, becoming pale towards the outer line; it shows a pale, sometimes whitish cellular spot, surmounted with raised scales. It can be seen that these raised scales (easily lost in setting the insect) accompany the median lines as well as forming the discal mark and the linear patch on the basal field. The terminal edge of the wing is again pale or ruddy before the terminal black line. The fringes are blackish. The hind wings are pale yellowish white, shaded with fuscous on costal region and more or less terminally before the blackish terminal black line; the fringes are dusky. Beneath the fore wings are blackish, marked with pale on costa; hind wings as on upper surface. Body blackish gray, with often a reddish cast on thorax above and on the vertex. The eyes are naked, the labial palpi long, ascending, with moderate terminal joint. Tongue rather long. The gray abdomen is annulated with dirty white, the legs are pale dotted. The species differs from the European *abietella* by the raised scale tufts on the wings, and Prof. P. C. Zeller, who has kindly compared examples for me, declares it to be quite distinct from any European species. The pupa seems to differ from that of *abietella* by the clypeal prominence, which appears entirely absent in the European

species, judging from Ratzburg's excellent figures. The larva is found to attack also various imported conifers; for this reason I supposed it might be an imported parasite. It has been noticed on the Scotch, Austrian and Russian Pine, and it will be found, I fear, a grave enemy to the cultivation of this genus of plants.

Since the insect is not noticed yet in any scientific publication, I propose to name it *Nephtopteryx (Dioryctria) Zimmermani*, after Charles D. Zimmerman, of Buffalo, who has made many excellent observations on our noxious insects, and to whom I am greatly indebted for help in getting the present facts with relation to the species. He has kindly spent much time in climbing large trees and cutting out pupæ and larvæ and rearing the perfect insect.

The larva of *abietella* is described by Ratzburg as living in the cones chiefly of various species of *Pinus*. Nevertheless, he speaks of one instance in which it is found under similar circumstances to those which are usual with *Zimmermani*, which latter I have not yet noticed attacking the fruit. The European species is said to winter in pupa state. In the vicinity of Buffalo our species seems to be single brooded. I have not yet ascertained the winter state. Ratzburg recommends cutting off infested branches, but especially on small trees. I find the larva of *Zimmermani* usually infesting the *main* stem at the insertion of the branches. From the fact that the pitch of the trees offer a protection, I do not think that any washes would reach the insect. The knife, then, seems the only remedy.

Our species has a natural enemy in a small hymenopterous parasite with which I have found certain of the chrysalids to be filled.

ON THE HABITS OF AMBLYCHILA CYLINDRIFORMIS.

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

The great interest in which this beetle has been held by Entomologists for so long has rendered an accurate account of its habits very desirable; but for a very long period—over twenty years—it has singularly eluded more experienced observers. In the Proceedings of the

Kansas Academy of Science for 1876, a slight account was published by Mr. H. A. Brous, but from the very small number taken by him, his article was necessarily imperfect. I have taken more than five hundred living specimens from the plains of Western Kansas during the past two years, and have watched their habits closely. Without being aware of Dr. LeConte's suggestion as to their nocturnal habits, one would readily arrive at that conclusion from the large numbers of their remains constantly met with scattered about, or in the excrement of nocturnal birds. With the first living specimen their peculiar habitat was readily understood. They may be met with in great abundance on gently sloping banks of firm loam, but partially covered with vegetation; they will not live in banks at all sandy. They never burrow, but enter any convenient hole at the approach of the sun, to come out again and wander in search of food at sunset. In cloudy days they will remain out, but with the first sunlight they disappear into their retreats, not to return until evening. The first one taken this year was on a pleasant evening in May, the 21st; but, though hunted for assiduously, no more were taken till near the middle of June. In a week or two later they were found in the greatest abundance.

The males, at first numerous, invariably soon begin to decrease in number, and are more abundant early in the evening. By the middle of September the females also have become rare.

The eggs are deposited near the surface of the ground, in groups of from one to two dozen. The young larvæ immediately burrow downwards, but come to the surface at dark to lie in wait for food, which consists mostly of ants and small insects. The holes are extended to surprising depths. In some instances I have traced them for nearly three feet. The mature larvæ are over two inches long, with very strong mandibles and maxillæ. They may be found most readily either in May or August. Singularly unlike the imago, they are very shy and easily alarmed.

The adult beetle might very appropriately be called stupid. Their power of sight is *extremely* feeble. Wandering aimlessly about in search of food, they are first apprised of their prey by their antennæ, when by a short, sudden spring they fasten their relentless mandibles into their victim.

Their food consists in large part of the smaller apterous Tenebrionidæ, such as the *Eleodes* or *Aside* that are found on the plains in such abundance, especially during the time and in the places so peculiar to the

Amblychila. Such Orthoptera as they are able to seize, they eat with the greatest avidity, but it is *very* rarely that they are able to catch any but the slow moving walking-sticks. They also devour a great many ants. They never feed on effete or decayed matter.

A dozen or more, when confined in a small space, will rarely injure one another, but are readily kept captive, eating any fresh animal food and even thriving on fresh meat. Their appetite is by no means small! They never heed an observer or collector till touched.

The males in the great majority of cases are larger than the females and may be readily distinguished by the sharp-pointed trochanters of the hind coxæ.

DESCRIPTION OF THE PREPARATORY STAGES OF PHYCIODES HARRISII, SCUDDER.

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

I received, 25th June, from Mr. C. P. Whitney, New Milford, N. H., a cluster of about 50 eggs of this species, laid on the under side of a leaf of *Diplopappus umbellatus*, date of deposition not stated. The larvæ hatched 28th June. The food plant not being obtainable by me, I gave them leaves of *Chelone glabra*, on which *phaeton* feeds, but so long as the least bit of the dry leaf of *Diplopappus* on which they hatched remained, the larvæ declined the *Chelone*, and then after starving many hours they attacked it vigorously. But, meantime, for want of proper food, several died. They manifested alarm just as do the larvæ of *nycteis* and *phaeton*, by a jerking motion of the body from side to side, the last segments being fixed to the leaf, and all the larvæ jerking together. This is contrary to the habit of *tharos* so far as observed, nor have I seen it in other species. On 2nd July the first moult was passed, and the larvae now utterly refused *Chelone*, although gnawing the edges of a bit of white paper in their hunger. I gave them Aster and on this they fed readily to the last, eating any species indifferently. On 7th July they were passing second moult, and on 12th and 13th, the third moult. Shortly after this

they stopped feeding and gathered in a cluster on the cover of the glass in which they were kept, and became lethargic. Their behavior throughout was like the larvæ of *nycteis*, though they are cleaner in feeding than that species, which keeps itself in a mire on the leaf. No web at any stage was spun for protection or other purpose, and they are hibernating now on a slight mat of silk made upon the cover of the glass.

Earlier this year, May 24th, I received from Mr. Whitney about a dozen larvæ of this species, found by him soon after awaking from their hibernation. These were of all stages from just after second moult to the fifth, or the mature larva, and one made chrysalis 26th May. From this the butterfly emerged 4th June. Evidently these larvæ hibernate after both second and third moult, as do those of *phaeton* and *nycteis* and *tharos*, though all which I now have in hibernation (16 in number) have passed the third. In all stages the larvæ resemble closely those of *phaeton*, changing from ochraceous, lighter or darker, to deep fulvous, and striped with black. So the spines and their branches are those of *phaeton*, and differ much from *nycteis*, as the coloration of the body differs. The egg also is nearer *phaeton* than *nycteis*, but the sides are more sloping and less rounded, and the ribs spring from the base instead of the middle of the side. The chrysalis is shaped like that of *tharos*, and colored like that of *phaeton*. There is much variation in the coloration in individuals. One of the larvæ was nearly black at maturity, the fulvous being represented merely by a few dots and small spots. The butterfly from this larva is very melanic on both sides, in as strong contrast to the rest of the brood as was the larva. The species is single brooded, like *phaeton*, while *nycteis* is double brooded in W. Va., and *tharos* many brooded.

EGG—In shape a frustum of a cone, flattened at base, the top a little depressed, the sides but little rounded, ribbed, the ribs standing well apart, 15 or 16 in number, and starting from the base, increasing in elevation above the surface as they approach the middle, then decreasing to the summit; color lemon yellow.

YOUNG LARVA—Length $\frac{1}{16}$ inch.; cylindrical, the segments well rounded; color yellow-green. semi-translucent; somewhat pilose; head obovoid, bilobed, the vertices rounded; larger than second segment; color dark brown.

AFTER FIRST MOULT—Length $\frac{2}{16}$ inch.; thicker in middle segments; armed with seven rows of short black spines, thick at base,

tapering, and thickly set with short black bristles; there is also a row of small, similar branching spines over the feet; color yellow brown, the second segment quite dark, and on this is a collar of minute branching spines; there is also a dark medio-dorsal line; head obovoid, rather flattened frontally, the vertices rounded; color black brown, with many black hairs.

AFTER SECOND MOULT—Length $1\frac{1}{2}$ inch.; shape and spines as before; color ochre-yellow, with five transverse black lines on the segments, and a dark medio-dorsal line; head as before, black.

AFTER THIRD MOULT—Length $1\frac{3}{4}$ inch.; spines and bristles larger in proportion; color deeper ochre, striped as before.

AFTER FOURTH MOULT—Length $1\frac{1}{2}$ inch.; color red, or orange ochraceous; the transverse lines distinct, and edged unevenly, one before each row of spines and two after; at base of body, on feet, an ochrey ridge; the spines short and stout, with very divergent bristles; head as before, the surface finely tuberculated, black.

AFTER FIFTH MOULT—Length $1\frac{3}{4}$ inch., increasing to $1\frac{5}{8}$, and in one example to one inch at maturity.

MATURE LARVA—Cylindrical, of nearly even diameter throughout; color deep red fulvous, crossed by black stripes, one before and two after each transverse row of spines, and with a medio-dorsal black longitudinal stripe; the last two segments nearly all black, and on 9 to 11 the fulvous bands are macular; the spines on each segment also stand on a broad black band; spines in seven principal rows, one dorsal, three lateral on either side, long, tapering, black, each thickly set with long divergent black hairs, and each rising from a broad, round, shining black, or blue black base; over the feet a similar row of small spines; the second segment with a collar of small branching spines; feet and prolegs black; head obovoid, flattened frontally, cleft, the vertices rather pointed than rounded, black, granulated, and with many short black hairs.

CHRYSLIS—Length $1\frac{3}{8}$ inch.; cylindrical; head case compressed transversely, nearly square at top, bevelled at the sides; mesonotum rounded, not prominent, followed by a slight depression; abdomen stout, with several rows of small sub-conic tubercles, two of which are extended to upper side of mesonotum; color pure white, marked and spotted throughout with black, or brown black, and orange, and showing much variation in individuals; the last segments black; a broad band of black

on the ventral side reaches from the head case to lower end of wing cases, and the abdomen has orange bands between the segments; on the wing case a curved black band crosses longitudinally, and in this the nervules of the wing are orange; there is also a row of black dots or small spots about the hind margin; the tubercles orange, and nearly all have a black crescent on the anterior side; on the posterior side of the abdominal segments are also small black spots. The coloration varies much, and some examples are almost deprived of the black markings, while retaining the orange.

NOTES ON CATOCALÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Catocala junctura Walk.

Dr. Bailey has taken near Albany a little larger form than *unijuga*, with rather paler primaries and much the same markings. The hind wings are a little more pinkish, without the dusky basal hairs of *unijuga*. The band is a little narrower than in *unijuga* and terminates much before the internal margin. It tallies with my recollection of Walker's type of *junctura* in the British Museum, and I am disposed to think that *junctura* is now rediscovered.

Catocala Anna Grote.

Mr. Thos. E. Bean has taken this species in Illinois. It varies slightly in the terminal band being sometimes entirely broken before anal angle.

Catocala Frederici Grote.

This species, described by me from types in the Royal Museum at Berlin, taken by Friedrichs in Southern Texas, has now been rediscovered by Belfrage in Bosque Co. Mr. Belfrage sends me a specimen under the number "672," taken on pine, which agrees perfectly with the original description and with a water-color drawing made from the Berlin speci-

mens by Tieffenbach, and sent me by the late Prof. Hopffer. The species is a little smaller than *illecta* (*magdalena* Strecker) and may be easily recognised by its pale greenish-gray, mossy primaries, with the lines dusky and rather diffuse. The hind wings are light yellow with the median band straight, terminating before the margin with a short, rather abrupt curve. The terminal band is abbreviate, narrow, scalloped on its outer edge over the median nervules. There is a small black spot on the margin before anal angle. The species is very distinct and can be mistaken for no other.

Catocala abbreviatella Grote.

I have this species from Illinois, taken by Mr. Bean. The t. a. line is straight, outwardly oblique to below median vein, when it becomes obsolete. It is not black shaded as in *Whitneyi*, which I have from the same locality. The three species, *nuptialis* (= *myrrha* Strecker), *abbreviatella* and *Whitneyi*, form a series of allied forms, but can be sufficiently and readily distinguished.

Catocala gracilis Edw.

The form described by Mr. Edwards has the primaries light gray, the lines broken and the internal margin more or less shaded with blackish. The species recalls the concluding *amica* group in the colors, bluish gray primaries and bright hind wings, and I have put it last in the series on this account. I am not certain now what Mr. Edwards' *similis* is. In Mrs. Bridgham's collection is (or rather, was) a specimen labelled *similis* by Mr. Edwards, which belonged to what I consider as a variety of *gracilis*, having the primaries mixed bluish gray, rather dark and somewhat hoary. The lines are distinct, or usually so, and the basal dash of *gracilis* is wanting. This last seems the only important character, but it is present in var. *basalis* of *habilis* and wanting in the type. This dark form (which seems also a little shorter winged) has been taken with the type by myself near Buffalo, and by Dr. Bailey near Albany. I have seen it also from Pennsylvania. In the collection of the Ent. Soc. of Phil. there is a specimen labelled *similis*, which in my "Revision" I have referred to as belonging to this variety of *gracilis*. But Mr. Edwards' description will not agree in this that he says: "beyond is a ferruginous band followed by a gray line which is dilated on the costa so as to make a triangular apical spot." This and the size will not correspond, and it is probable that Mr.

Edwards has described some one other of our yellow-winged smaller species, and has afterwards mistaken his species, or mixed up different forms at the same time. This mixed dark blue-gray form, with distinct black lines and without the small basal streak of *gracilis*, I propose to designate by the name *sordida*; it varies as *gracilis* does in the suffusion of the primaries along internal margin with black in some specimens. Both the description and the type of Mr. Edwards' *parvula* correspond to that form of *minuta* which has this dark suffusion on primaries. *C. minuta* is allied, though a smaller form, to *fratercula*; both forms have the dentate white subterminal line usually obvious. From an examination of Kansas specimens, no doubt remains on my mind that *atarah* is founded on more generally obscure specimens of *fratercula*. An example of *fratercula* in the collection of Dr. Bailey has the primaries suffused with black over the median space.

NOTES ON THE LARVA AND PUPA OF EUCHAETES COLLARIS.

BY G. H. VAN WAGENEN, WESTCHESTER CO., N. Y.

I have, for three seasons, raised *Euchaetes collaris* from the larva, it being very abundant in this locality, and present the following notes as the result of my observations:

The larvæ feed on the *Apocynum androsaemifolium*, or Spreading Dogsbane. They will in confinement feed on *Asclepias*, but I have never, after careful search, found but one of the larvæ on it in the field. They feed at night, leaving their food-plant and hiding themselves during the day. About dusk they will be found crawling up the stems of the *Apocynum*.

Unlike *egle*, which feeds in companies, these are solitary feeders, and I have never found more than two on the same plant; generally there is but one. The color of the hairs in the early stages of the larva is almost white, but changes to slate color when ready to go into the chrysalis.

The early broods go into the chrysalis state about the end of July, and the imago appears in ten days or two weeks. The later broods remain in

the chrysalis during the winter, and emerge in the following June. They spin a slight cocoon between the leaves or on the ground. They are very easily raised, and require little feeding, eating much less than *gla.* The moth appears here from the middle of June to about the middle of July, and again the latter part of August.

I am indebted to Dr. Lintner, of the State Museum at Albany, to whom I mailed specimens of the larvæ and pupæ, for the following scientific description. The Dr. states that these specimens were not in the best condition for the purpose, "having lost many of their hairs from rolling," but on comparing his description with larvæ fresh from the plant, it seems to me perfectly correct.

LARVÆ OF EUCHAETES COLLARIS.

Sub-cylindrical, tapering moderately at the extremities. Head nearly as large as the first segment, pale luteous with black ocelli; body pale bluish white, semi-transparent; the pro-leg bearing segments with twelve rows of tubercles, from which radiate pearl-gray branching hairs varying from sparsely sub-spinose to thickly branched, which dorsally are about the length of the diameter of the body, except on the last three segments, where are some twice as long; the lateral hairs are shorter, but perhaps from attrition; the longer hairs tend to unite at their tips in pencils of a slaty hue. The tubercles, in their location on the segments referred to, alternate between their anterior fourth and posterior third; the sub-dorsal ones are oval, the lateral ones elliptical, the latero-stigmatal sub-rotund, as are also the much smaller stigmatal ones; the form of those of the two inferior rows is not evident. The stigmata are small, narrowly elliptical, white, annulated with black. The legs are unicolorous with the body, the terminal pair quite projected backward.

Length of the larva at rest, .87 inch; in motion, 1.12 inch. Diameter at broadest part, .16 inch.

The cocoons are slight, consisting almost wholly of the hairs of the larva, closely investing the pupa, their length from one-half to five-eighths of an inch, with a diameter of about one-fourth of an inch.

The pupæ are black, closely punctated, ovoid, the terminal segments blunt and unarmed, the thoracic portion projected over the wing-bases in a sub-quadrate form.

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

Room 56, Maxwell House, Nashville, Tenn., Aug. 31, 1877.

Mr. Grote was called to the chair and congratulated the meeting that there were found members from the South interested in the science of Entomology, and regretted the absence of the President of the Club and other officers. A letter was read from President LeConte as follows:

Philadelphia, Aug. 24th, 1877.

Secretary of the Entom. Club Am. Assoc. Adv. Sci., Nashville, Tenn.:

DEAR SIR,—I beg that you will express to the Entomological Club of the Association my great regret that I am not able to attend the meeting at Nashville. It was my intention to be present, but I find now at the last moment that it will be extremely inconvenient for me to leave this city. I greatly wished to take part in the discussion on nomenclature, but I have already expressed myself so strongly as against such changes as are produced by the rehabilitation of forgotten or disused names, that I think my opinions are fully understood by my colleagues

Very truly yours,

JOHN L. LECONTE.

The Secretary's report of last year's meeting was received and adopted.

The chair drew the attention of the Club to the report of Capt. Dall on the subject of Zoological Nomenclature made at this meeting, and deprecated any separate action on the part of the Club.

The following resolutions were then passed:

Resolved—That since the Association has under consideration the subject of Nomenclature, the present Committee of the Club on that subject, consisting of LeConte, Riley, Saunders, Scudder and Grote, be continued to report at next meeting.

Resolved—That a request be made on the part of the Club to the Standing Committee of the Association, that copies of Capt. Dall's report on Zoological Nomenclature be printed and distributed to all active members of the Club before the issuance of the Nashville volume, so that the matter may be duly considered before the next meeting of the Club.

The meeting then entered into an election for officers for the next meeting, with the following result :

President : James A. Lintner, of Albany, N. Y.

Vice-President : Wm. Saunders, of London, Ontario.

Secretary : B. Pickman Mann, of Cambridge, Mass.

Mr. Grote exhibited specimens in all stages of the new Pine Moth, *Nephoptyx Zimmermani*. He referred to Mr. Meehan's remarks after the reading of the paper before the Association on Thursday last, that this was probably the insect so destructive to the Scotch Pine about Philadelphia.

Prof. Nicholson stated that he thought from Mr. Grote's description and specimens that this insect was the one noticed as attacking the Scotch Pine near Knoxville. The trees had been imported from the north.

Mr. Grote alluded to the migratory habits of the Cotton Worm, and stated that in his original paper (Hartford meeting) he had shown that the moth hibernated, but died before it could find cotton on which it could oviposit the ensuing year. Where the moth state was not reached the chrysalis perished in cold winters over the cotton belt. The broods were irregular, occurring in the same locality some years as early as June, some years as late as September.

Prof. Stubbs stated that in the main Mr. Grote's theory of a progression from south to north was, he was satisfied, correct. At the same time he called attention to occasions where the moth appeared in small areas, and thought it possible that in some cases the insect might succeed in holding over.

Mr. Grote stated that he thought that in localities where the circumstances were favorable, Southern Florida and along the coast of Georgia, that this might occur. He had in his original paper alluded to this, and he thought it more likely that the irregular patches on the cotton belt were partial colonizations from the southward or from the sea coast of Florida and Georgia. The first brood was more irregular in distribution. He further said that Prof. Tutwiler, of Ala., had told him that the observations made in his locality were to the effect that a south wind brought the worm; in the present year the prevailing winds were from the north and they had been free from the worm in Northern Alabama. Mr. Grote concluded by urging the creation of a scientific commission to look into

the facts of the case. It was one that was the most important to the agricultural interests of the South.

Prof. Nicholson stated that he had observed a few specimens of the Colorado Beetle near Knoxville; the seed had been brought from the north.

Judge Bell stated that this year he had seen the Potato Beetle at Exeter, New Hampshire.

Mr. Grote exhibited some rare Coleoptera collected at Buffalo, N. Y., by Mr. Ottomar Reinecke. Adjourned.

(Signed) A. G. WETHERBY, Sec'y *pro. tem.*

NOTES ON SOME SPECIES OF HOMOPTERA.

BY THOS. E. BEAN, GALENA, ILLINOIS.

The suggestion of Mr. Hill (quoted on p. 89) that *Homopteras* "*edusa* and *lunata* are possibly sexes of one species," has reminded me of my own doubts regarding not only *edusa* and *lunata*, but also *Saundersii*, and caused me to make a careful examination of my material.

My entire stock numbers 83 local specimens, arranged after authentic types in three series, consisting of 42 "*lunata*," 24 "*Saundersii*," and 17 "*edusa*."

The specimens separated as *lunata* show no white lines or areas on upper side of wings.

The *Saundersii* have two large ovate or crescent areas on outer edge of primaries, and one similar but still larger crescent on outer edge of secondaries; these areas are partly outlined with white or greenish-white, especially on the inner side. There are also white or greenish-white ill-defined bands across fore wings at region of anterior transverse line.

The *eduse* are like the last in appearance in all respects, except that the six marginal lunates are filled out with white, or pearl, or greenish-white.

After repeated observation and comparison of these 83 specimens, I feel no particular hesitation in declaring that the 42 *lunata* are all females, the 24 *Saundersii* and the 17 *edusa* all males.

Examination of the three series above mentioned appears to make evident the following results :

First—That the specimens do *easily* distribute into said three sets.

Second—That in general appearance the *Saundersii* and *edusa* series would be almost or quite indistinguishable but for the fullness of white on margin spaces of latter form, which constitutes so conspicuous a distinction.

Third—From the other two series that of *lunata* not only differs in lacking the white decoration, but is also different in the tone, the hue and depth of the diffused shades of color on the wings ; so that *lunata* differs from the other two markedly more than those differ from each other.

Fourth—Aside from mere color and shading, the definite markings are *alike in the three series*. Upon the basis of the characteristic lines alone, tone not taken into account, it would be safe to say that if there are two or more species within the limits of the entire set of specimens, then the same two or more species can also be found in *each* of the three series as above arranged ; that is, there is as much *essential variation* in either series as between any two series, or very nearly as much.

Fifth—By superior robustness of body, and especially greater fullness of abdomen at post-median region, as also in regard to antennæ, the specimens in *lunata* series differ strikingly from those of the *Saundersii* and *edusa* series. From these characters, with the difference of tone and absence of white clouding, I conclude that *there is a valid distinction of the lunata set from the other two*.

This distinction of *lunata* from the others must be either of species or of sex. As the *Saundersii* and *edusa* series differ unimportantly, by presence of a little white or much white, a distinction which alone is not valid either for a difference of species or sex, and as *these seem to be males* ; as, furthermore, the *lunata* do validly differ from the others for species or else for sex, and *these seem to be females* ; and as, finally, the three sets are alike in the definite lines important as criteria of specific difference—I therefore conclude *Saundersii* and *edusa* two male forms, and *lunata* the female form of one and the same species.

DETAILS OF COMPARISON.

Among the lunatae there is only moderate variation, consisting chiefly in less or greater development of the brown suffusion and the blue-black shades; in about seven specimens the dark shading is largely obsolete and replaced by light brown in an area on f. w. from t. a. line to t. p. line and beyond, extending partly to outer margin, but not reaching costa. There is an appreciable though slight variation as to curves and dentations of t. p. line.

The Saundersii present moderate variation as to amount of the white decoration, and in several specimens this is almost replaced by greenish white. There is some variation in tone of coloring, in degrees from medium brown to dark, somewhat purplish brown. One or two show on f. w. a somewhat yellowish light-brown area between t. a. and t. p. lines, not reaching costa. A little variation in t. p. line.

The edusa vary slightly as to fullness of the white ovals or crescents on margins. Also as to color of same; some have crescents entirely white, others have them greenish but outlined with clear white. On f. w. of two examples area from t. a. to t. p. line is colored nearly uniform yellow-brown, the dark shades almost obsolete. Regarding variation in tone of coloring, the comment on *Saundersii* applies equally to this set.

EDUSA AND SAUNDERSII COMPARED.

Closely alike in size; if any difference, the latter average slightly larger.

Coloration, except as to degree of white, furnishes no means of separation.

In *Saundersii* the marginal crescents are merely sketched or outlined with white, pearl, or greenish-gray; in *edusa* the crescents are filled out with an amplitude of white, &c., some specimens showing greenish-white crescents outlined with clearer white. *Saundersii* looks like an unfinished *edusa*.

In observing the white decoration, at first the division of the two sets seems complete, but closer search discovers one *edusa* from whose marginal crescents the white is about half obsolete, and among the *Saundersii* are two whose crescents are so largely powdered with white that the step between these two and the cited *edusa* is no wider than the interval

between these two and the other *Saundersii*. Still, aside from these three, the specimens in either set are greatly uniform among themselves and the contrast is great between the two sets *as to this feature of decoration with white*.

I am unable to find other severance than by this white decoration ; indeed, the two series are in other respects such counterparts that if the sex characters permitted, I should conclude *edusa* the male and *Saundersii* the female. But very evidently such is not the case, for both series seem to contain males only.

LUNATA COMPARED WITH THE OTHERS.

Individuals more robust in body than those of the two other series, but as to expanse of wings about the same average.

Of the 42 specimens almost all have the general appearance of females. Of only one or two would there seem any doubt, and even these do not look like males, but their appearance is less conclusive as to their sex. In the other sets the reverse seems the case ; all but two or three decidedly appear to be males, and the exceptions do not look like females, but merely have less definite characters.

In color *lunata* contrasts with the others by a more sombre style of decoration.

On under side the markings of the three series agree as to essentials, the difference being in shading, &c. *Edusa* and *Saundersii* are alike, with a moderate range of individual variation. *Lunata* has on an average more distinct markings, varying to partial obsolescence of the strong lines.

The three forms occur coincidentally, the season of chief abundance, as indicated by the dates of my specimens, being from mid-July to about 10th August. A few bright ones show dates during September, others late in October, and one *lunata* November 12th. Of the late flight, part survive winter and are found in June (May more rarely) much worn. No evident fresh examples dated earlier than July 15th.

P. S.—On p. 136 see Mr. Grote's correction of p. 89.

A few *lunata* and *Saundersii* taken during the past two weeks (August 11th) tend to confirm the foregoing comments.

CORRESPONDENCE.

BUTTERFLIES ON MARTHAS VINEYARD.

DEAR SIR,—

I have spent the last ten days on this island, at Oak Bluffs, and made several excursions into the back country for a distance of about three miles. I find *C. phleas* the commonest butterfly, seen everywhere, in the town, fields and on the beach. Next to that *Argynnis idalia*, which abounds in old fields, and is just now fresh from chrysalis. Of *P. tharos* I have taken two fresh males, var. *marcia*. *Satyrus alope* male is making its appearance and the species may become quite common. I am not sure that some examples of *nephele* have not been seen also. Another *Satyrus* I saw in the oak woods, but could not determine whether it was *eurytis* or *canthus*. *Philodice* seems rare, and I have seen one example of *antiopa* and one of *atalanta*. No *Hesperians* at all have been seen, and no other butterfly than I have above mentioned. On a ride to Boston I saw a *Terias nicippe* flying near Brockton Station.

W. H. EDWARDS.

July 29th, 1877.

DEAR SIR,—

Perhaps some of the readers of your valuable paper might be interested in knowing of the capture at this place of another superb *Catocala marmorata* Ed., which I took July 2nd. It was sitting on the trunk of a Silver Poplar tree, within a few yards of where I captured one on July 10th, last season. Prof. Wetherby and myself have each taken a single specimen of *Catocala agrippina* Strecker, whose types were from Texas, I believe.

CHARLES DURY.

Avondale, Ham. Co., Ohio, Aug. 15th, 1877.

DEAR SIR,—

On p. 120, vol. ix., CAN. ENT., is published a note by Mr. Robert Bunker, referring to the "effect of hot weather upon certain Sphinges," particularly *P. satellitia*.

I have regularly for several years past taken mature larvæ of *P. achemon* previous to July 10th, the transformation of which, so far as I know, was

completed by Sept. 25th of the same year. This year, although everything is about two weeks behind its usual time, I received two mature larvæ July 5th, both of which had unfortunately been killed; with them came a moth taken the same day, whose wings had not expanded when discovered.

The time from deposit of egg to pupation is about eight weeks, sometimes a day or two more, but usually three or four days less, hence these ova must have been deposited before May 10th, or before even *Colias philodice* had appeared. As I know of no Sphinges emerging here before the middle of June, the contraction of the time of growth would be very remarkable in this case, even had the weather been hot, which it has not.

I have taken this moth (*P. achemon*) in May, flying about the early spring flowers in company with *Dcilephila lineata*, both very ragged and much faded; this would seem to suggest that *P. achemon* (and perhaps other Sphinges) exists as it were in duplicate, the September examples hibernating in the perfect state and depositing ova in the spring. A state of affairs possibly instituted by a long, dry and warm season in summer and autumn, and continuing until a severe winter, destroys the hibernating examples, which must also suffer greatly from mice, and their ova and larvæ from late frosts, thus accounting for their rarity.

This is, I admit, a very weakly supported hypothesis, resting entirely upon circumstantial evidence, as early examples of strong moths like Sphinges *might* travel many miles before a strong south wind; if, however, some collector who has females emerge in September, would dissect them and ascertain how far the ova are developed, the result would probably offer a satisfactory solution as to the probability of occasional or regular hibernations.

It may be a matter of interest that *Pieris rapæ* has reached this point in its westward journey. I took one ♂ example at Maplewood, immediately west of this city, Sept. 8th; seemed to be more abundant than *P. protodice*, which was flying in the same locality.

C. E. WORTHINGTON, Chicago.

DRYOCAMPA RUBICUNDA (FABR.)

DEAR SIR,—

Mr. Linter, in his "Entomological Contributions," No. 3, has a very elaborate description of this larva, noting, indeed, very minute char-

acters and some which are by no means constant, such as the number of spinules on different portions of the body. There are some few words to which exception may be taken; for instance, the color is not always "apple green," being not unfrequently greenish-white, and in such case the lateral stripes are nearly black.

But, speaking generally, the description is very accurate; one important omission has, however, occurred, and it is to this omission I wish to draw attention. I have, from time to time, reared hundreds of these larvæ, and I never saw one that had not a *conspicuous red patch*, with white granulations, on the stigmatal portions of segments 11 and 12. That so careful an observer as Mr. Lintner should have overlooked this mark, had it been present in the specimens he examined, seems improbable; and now the question arises—Has not Mr. Lintner described some species not *rubicunda*?

I urged this consideration on Mr. Lintner some two years since, and sent him a small batch of larvæ for his examination. I think he told me that they all died, and, so far as I know, he has taken no further notice of the matter.

I have an indistinct recollection that some one has recently described a new species of *Dryocampa* allied to *rubicunda*, but do not feel quite sure; but, any way, the questions are important—Did Mr. Lintner describe *D. rubicunda* larva inaccurately? or, Did he describe the larva of a new species? or, Do the larvæ of *rubicunda* vary to the extent of sometimes losing the red patch?

W. V. ANDREWS, Brooklyn, N. Y.

FOOD PLANTS OF SATURNIA IO.

DEAR SIR,—

The larvæ of this species are unusually abundant here this season and I have taken them feeding on White Birch, Oak, Corn, Willow, Sweet Fern (*Comptonia asplenifolia*), Currant, Apple, Wild Indigo (*Baptisia tinctoria*), Clover, Bush Clover (*Lcspedeza*), Snow Berry (*Symphoricarpos*), and the Ash.

L. W. GOODELL.

Amherst, Mass., Sept. 1st, 1877.