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No. 1

THE NATURAL HISTORY OF *COSSUS CENTERENSIS*.

BY JAMES S. BAILEY, A. M., M. D., ALBANY, N. Y.

Although *Cossus centerensis* has only recently been discovered, it must have existed for many years in the vicinity of Center, N. Y., its present home. More than twelve years ago, while riding in a Central R. R. coach, I noticed certain species of Poplar, the central shoot of which had perished from causes then unknown; later, while on an Entomological tour near the same place, I found a group of the *Populus tremuloides* which were similarly affected, as were also many other trees of the same species in the vicinity.

On closer inspection many perforations were found in the trunks of these trees, some of which were of recent origin, but nothing then was discovered to explain the cause and consequent unhealthy condition of this species of timber; several times each year afterwards this group of Poplars was examined, but nothing definite was learned until during the month of July, 1876, when a brittle pupa-case was found protruding from one of these openings. This gave a clue which revealed the true nature of the destroyer of this woody growth. On the 10th of June, 1877, a fresh pupa-case was discovered, removed and examined, but the *Cossus* could not be found, although probably resting upon the tree at that time.

It now remained for the youthful and keen eyesight of my son, Theodore P. Bailey, to discover the imago. The facts as related were communicated to stimulate him to vigilance, and the trees were examined daily, every foot of them being closely scrutinized. June 14th of the same year he found a fresh pupa-case, and but a short distance from it a male *Cossus*, which had apparently just emerged. This insect was given to Mr. Lintner, who subsequently described it in the CANADIAN ENTOMOLOGIST. I am now enabled to add a few facts in reference to the natural history of this borer, to give a description of its earlier stages

which have hitherto been unrecorded, and have also added a more minute description of this interesting moth. The accompanying lithograph represents the insect in its different stages, life size. This season (1878) beautiful specimens of both sexes were obtained during the month of June, from which our illustrations were made by Paul Riemann, a naturalist and artist. During 1877 the majority of examples obtained were females; during 1878 the reverse was the case, as males largely predominated.

It was ascertained that the time for the *Cossus* to emerge was from dark to early morning, or between the time of the setting and rising of the sun. Every day the empty cases were removed, and by counting them it was known how many to expect to find, which aided the collector much.

As might be expected from the aborted tongue, this *Cossus* is not attracted by sugar. The trunks of the trees from which they emerged, as well as neighboring trees, were sugared extensively during the time of their appearance, but not one came to taste the bait. During this process, in examining the sugared patches, the light from the bulls-eye lantern was thrown repeatedly upon the surface of the Poplar trees, and several were observed at different times in the act of emerging.

Just before the final transformation the pupa renews its efforts and pushes itself through the thin bark that has been allowed to remain by the larva. It pushes itself through the opening as far as the base of the abdomen, when, after a while, the exposed pupal skin becomes dry and splits, and the moth escapes, climbing up the bark of the tree, shaking out its wings until developed. The moths usually select the end of a dead and broken limb or protuberance of the roughened bark to rest upon, which their color so closely resembles that it is exceedingly difficult to discover their whereabouts.

The empty pupa skins remain at the entrance of the tunnel. The moth itself at first is rather sluggish, and can be captured readily on the bark of the tree in which it has passed its immature state. The moth is very liable to "grease," consequently it is advisable to let it thoroughly dry before capturing and pinning. The cavity of the abdomen should be stuffed, and a few drops of benzole previously put in the cavity or placed upon the material used as stuffing.

The chrysalids vary much in size, some of which are infested by an ichneumon fly, which preys on the caterpillar. A pupa was observed endeavoring to make its way to the surface of the bark, but seemingly unable

to extricate itself, when assistance was rendered by enlarging the orifice. It was laid in a paper box for hatching; a few days afterwards many minute ichneumons were observed resting upon the wall near the box; on examination they were found to be escaping through minute holes in the pupa, which would barely admit a No. 3 Entomological pin. Fifteen of these perforations were counted in this pupa. I presume that the larva of the *Cossus* is pursued in its burrows by the parent parasite. If so, it is curious that the *Cossus* pupa is not killed by the parasites until it has worked itself up to the mouth of the tunnel, thus allowing the ichneumon flies to escape outside.

October 14th, we visited the trees which were known to be inhabited by the *Cossus*, for the purpose of obtaining caterpillars in the different stages of growth. A section of a tree measuring nearly four feet in length was taken, and from it six caterpillars were secured, two of which were occupying pupal cells preparatory to transformation. Judging from the difference in the development of the caterpillars taken at this time, it would seem as if it would require at least two years for their maturity.

While thus far the Center locality has proved to be the chief home of this *Cossus*, it will undoubtedly be found elsewhere wherever the *Populus tremuloides* is found. Several pupa cases of this species have been found in the corporate limits of Albany. Usually trees of less than one foot in diameter are attacked, although in one instance a pupa case was found in a tree measuring sixteen inches in diameter.

The larva, taken October 14th from its burrows, is 45 mil. in length, of a pale flesh color. It is a little broader anteriorly. The prothoracic segment is blackish brown above, the dark color edged with a dirty orange shading. The head is mahogany brown, shining, slightly roughened. The mandibles are black, with three strong teeth. The surface of the head gives rise here and there to single scattered hairs. The antennæ are three-jointed; the second joint gives rise to a single long hair. The 7th, 8th, 9th and 10th abdominal segments are provided with false feet. The segments are marked with a lateral row of brown dots above the reddish stigmata, and there is a row of similar dots, two to a segment, on each side of the dorsal line. These dots give rise to single pale hairs. The larva moves with freedom either backward or forward. The burrows which it excavates are about 15 millimetres in width, and terminate in the pupating cell, which is about 40 mil. in length, smooth; the extremity towards the opening is closed by a wad of finer and then coarser filings

of the wood. The coarser splinters are *not* detached entirely from the wood, but are split up by the larva all around the top of the cell, and project like bristles, appearing somewhat as those wooden toy-trees which are made for children, and which are formed by shaving down the wood and leaving the shavings still adhering by one end. These splinters make a firm wad. Against them are piled a quantity of finer chips or thin filings, which are loose, but pressed together.

The cell is about 40 mil. from the outer bark of the tree, and the chrysalis makes its way to the air through the burrow by means of its teeth on the segments and the spinose process on the front, by which it forces itself, by stretching and contracting the abdomen, through the wood scrapings which close the cell, until it comes to the end. We have noticed a fine thread of silk proceeding from the spinneret of the larva, although in the puparium we have found no silk whatever. The puparium seems to have been formed by wedging first coarser, and then finer strips of the wood together, and seems to be merely a more carefully and smoothly finished enlargement of the original burrow.

A specimen of the pupa which I have examined is about 30 mil. in length, narrow, brownish black, shining, rugose. The clypeus presents a strong broad spinous process, supported at base by lateral projections. On the underside it descends into a wide sulcation, terminating in a broad projection. The capital appendages are visible, and here and there arise isolated hairs as in the previous stage. The abdominal segments are provided with teeth over the dorsum, decreasing in size to the stigmatal line. The anal segment is provided with two unequal sized terminal teeth on each side of the vent.

The moth seems to belong to the genus *Cossus* Fabr., and not to be congeneric with *Xystus robinia*. The head is short, eyes naked, labial palpi small, appressed, scaled. The thorax is thickly scaled, the scales gathered into a ridge behind, and is squarer in front than in *Xystus*, not so elongate, or so elevated dorsally. The male antennæ are bipectinate, the lamellæ short, rather broad and ciliate. The female antennæ are serrated. It is allied to the European *Cossus terrebra*, while a larger insect. It differs from *C. querciperda* by the absence of any yellow on the male hind wings, and by its darker color and closer reticulations.

In color this species is black and gray; the edges of the thorax and collar are shaded with gray—more noticeable on some specimens than others. The primaries are covered with black reticulations, which are not

always identical in their minor details in different specimens, nor sometimes on both wings in the same specimen. Beyond the cell there is a transverse continuous line, broader than the rest and outwardly bent over median nervules. The ground color is blackish over nearly two-thirds of the primaries from the base, and outwardly gray. Hind wings rounded in both sexes, with blackish hairs at base, pale and sub-pellucid, with short gray fringe, before which there is a narrow blackish edging. The abdomen is blackish. The males are smaller than the females. The smallest male expands about 40, the largest female over 60 millimetres.

A female, after being captured and pinned, deposited three eggs, which were clothed with scales of the same color as those of its abdomen. The females possess a long ovipositor, with which they place their eggs securely in the deep crevices of the bark of the same species of tree from which they emerge. In due time the worms are hatched, and although very small, are soon able to bore into the tree, never apparently ceasing to eat and extending their tunnels through solid wood, first in the alburnum and then through the heart, their burrows increasing in size as the larva increases, until the latter are completely grown. In consequence of the innumerable tunnels cut in feeding many trees are destroyed.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

LAVERNA.

L. Murtfeldtella Cham.

Miss Murtfeldt favors me with the following notes upon the larva of this species: "It feeds in the flowers of the *Cenotheras* both wild and cultivated, and is especially destructive to *C. Missouriensis*, which is now extensively cultivated. The eggs are laid singly on the sticky surface of the calyx, and the larvæ, as soon as hatched, make their way to the centre of the bud and feed upon the petals and stamens. The full-grown larva is $\frac{1}{4}$ inch in length, cylindrical, tapering slightly posteriorly and anteriorly.

When young it is of a dull brownish-green color, gradually assuming a reddish tint, until at maturity the dorsum and sides are of a deep dull pink arranged in wavy shaded stripes, which are most intense on the subdorsal spaces. Head oblique, round, pale glossy grayish-brown, with dark brown mandibles and the triangular face outlined with the same color. Cervical collar entirely covering top of 1st segment of glossy dark grayish-brown, marked on the dorsum with a narrow but distinct longitudinal line of white. Anal plate brown and horny. Legs and prolegs well developed. Pupates in a dense, tough, yellowish-white cocoon on the surface of the ground. Moths issue in about ten days. There are at least two distinct broods in a season, the second of which hibernates in cocoon."

Miss Murtfeldt adds: "The *Enotheras* ought to be dear to the Entomologist on account of the numerous and beautiful insects which they foster. I have already reared from them seven or eight distinct species and am sure that there are still others."

One of these is *L. ? enotheræcella* Cham., which, however, is no doubt the same species placed by Zeller provisionally in *Phyllocnistis* as *P. magnatella*. As stated elsewhere, this, though not a true *Laverna*, is nearer to that genus than to *Phyllocnistis*.

L. enotheræsemnella Cham. is another of the *Enothera*-feeding species.

In Colorado I met with a larva believed to be that of a *Laverna* mining in the leaves of a species of *Enothera*, but I did not succeed in rearing it.

Including *enotheræcella*, there are thus five species of *Laverna* which are known to feed on *Enothera* in this country; and it is not at all improbable that other species will also be found to feed upon this genus of plants. The genus *Epilobium* is nearly allied to *Enothera*, and in Europe eleven of the seventeen known species feed upon *Epilobium*, one of the eleven also feeding on an allied plant (*Ciræa lutetiana*).

Since the original description of *Murtfeldtella* was prepared, I have also taken it in Kentucky. The dark lines and specks mentioned in the description are seen in the fresh specimens to be mostly composed of raised scales, and so likewise are some of the white marks; and there are also some raised scales on the thorax. Its nearest known congener seems to be *L. decorella* Stainton. A comparison of a good series of specimens satisfies me that *L. albocapitella* Cham. and *L. grissella* Cham. are merely variations of *L. Murtfeldtella*.

L. cephalanthiella Cham.

The description of this species, *ante v. 3, p. 221*, is very unsatisfactory, but it is next to impossible to describe satisfactorily these small species of many colors irregularly mixed and blended, and varying with every change of the light, especially when, as in this instance, there is considerable range of variation within the limits of the species. No difficulty will, however, be experienced in recognizing bred specimens, and no species has yet been discovered in this country which approaches it at all closely; and until some such species is discovered, the following general description of the fore wings will perhaps assist one in recognizing the species more than a more detailed one:

Varying in different specimens from ochreous dusted and overlaid with brownish gray, to brownish gray streaked or marbled with ochreous; that is, the proportion of the two colors varies greatly in different specimens, and even appears to vary in the same specimen according to the direction of the light and the power of the lens used in observing it. The grayish or brownish-gray parts of the wing have metallic reflections, and in some views it is a very pretty and in others a very plain insect; there is a large blackish tuft on the dorsal margin about the middle, and usually the portion of the disc above and behind this tuft is distinctly ochreous, containing a longitudinal blackish short streak; there is also a similar tuft about the anal angle; there are two costal blackish streaks behind the middle, and a third passes entirely around the apex; the apical half (and a little more) of the wing is more ochreous than the basal half, and the part of the wing *behind* the second tuft and *before* the second blackish costal streak is distinctly ochreous, with or containing a short blackish longitudinal dash (like that in the ochreous patch above the first tuft above mentioned). The ochreous of the wings has a reddish hue; the ciliæ are pale ochreous tipped with blackish and with a blackish hinder marginal line just before the tips. Apex of the fore wings obtuse.

In the statement, *loc. cit.*, that the mine and larvæ resemble those of *Aspidisca*, the word "larva" is a *lapsus penne*, though it is correct as to the mine. The mine, however, is more like that of an *Antispila* than of an *Aspidisca*; that is, the mine of the well-grown larva—its last mine—which is always, so far as I have seen them, (and I have seen a great many) near the edge of the leaf; but the young larva, before it makes that mine, usually makes two or three short linear mines beginning at the midrib. The imago does not resemble at all closely any species known

to me, but the larva resembles that of the European *L. substrigella*, as figured in Nat. Hist. Tin, xvi. The head is pale sordid brownish, upper portion of next segment a very little darker, with a crimson spot on each side of the dusky portion and another just above the feet. The next segment has the crimson spots larger and more diffuse, and on top of it begins a wide crimson line which extends along the dorsum of all the segments to the anal; the remaining segments, except the last two, have each three crimson spots on each side of the median crimson line, instead of two, as in those immediately following the head; each of the last two segments has a transverse crimson line.

L. obscurusella Cham.

The form of the palpi, the tufts along the dorsal margin of the fore wings, and the neuration of the wings in this species resemble those of *Chauliodus* Lint., and it perhaps belongs as properly in that genus as in *Laverna*—if, indeed, any well marked distinction exists between the genera.

L. ? ignobilisella Cham.

As stated in the CAN. ENT., v. 7, p. 51, the imperfect description of this species was unintentionally published, and the mistake was discovered too late to correct it. Since then, having received other material, I have been enabled to give a more correct account of the species. The ornamentation resembles closely that of *L. ? Coloradella* Cham., and they may prove to be varieties of the same species. The form of the head seems to me to differ, however, the head and face in the Texan specimens being wider than in those from Colorado in proportion to their length, and there is, so far as I am able to compare them with the material before me, a decided difference in ornamentation, though the resemblance is strong.

The wings are not tufted and the second palpal joint is but little enlarged towards its apex. Head, antennæ and basal joint of palpi silvery white, stalk of antennæ yellowish fuscous. Thorax and fore wings silvery white, with an ochreous costal spot about the basal fourth of the wing length, extended to the fold, sometimes interrupted so as to form two spots, one on the costa and one on the fold, and the costal margin to the base more or less stained with fuscous; just behind the middle the wing is crossed by an ochreous band, and the wing at its tip and along the base of the dorsal cilie is dusted and suffused with ochreous. Cilie white, hind wings and legs whitish. *Al. ex.* nearly $\frac{1}{2}$ inch.

PERIMEDE.

P. unomaculella.

Ithome unomaculella Cham., *ante v. 7, p. 94*.

This species is too near *P. erransella* Cham. to be separated generically from it. The neuration differs as follows: In the fore wings the median subdivides into four branches instead of into five; there are likewise no tufts on the wings and the palpi are perhaps a little shorter. There are no other structural differences, and they resemble each other closely also in ornamentation; *unomaculella* is, however, decidedly the smallest, having an *alar ex.* of only $3\frac{1}{2}$ lines. Perfectly fresh specimens of both are deep shining brown, but when a little worn they become dingy. Specimens of *unomaculella* differ as to the amount of white and dark brown on the terminal joint of the palpi; the antennæ are faintly and the tarsi distinctly annulate with whitish. Its position in repose is unknown to me, but *P. erransella* lays the hind legs along the abdomen and rests on the other two pair, with the face not quite touching the surface on which it reposes, and the hinder part of the body and wings elevated so that it looks as if it stood upon its head.

Æca ostryæella and *Chrysopelia purpuricella*.

I observe that at *p. 72, v. 4, ante*, the later generic name is misspelled *Chysopelia*. These two species can not be separated generically and are even very closely allied species. The antennæ of *purpuricella* are, *loc. cit.*, described as "sub-pectinate." I meant to write serrated, but those of *ostryæella* are more distinctly so; the palpi in the living insect are recurved in both. *Æca ostryæella*, like all the *Ostrya*-feeding species, is very difficult to rear, because the leaves dry or mould so quickly, so that out of hundreds of gathered mines I have only succeeded in rearing some eight or ten specimens—about equal numbers of both sexes. The generic and specific diagnoses were prepared from three males. The female differs decidedly from the male, and very closely resembles the male of *purpuricella*. The male of *ostryæella* is lighter colored and more grayish, with less of the purple lustre than the female, and in the latter pale grayish fasciæ are absent. Both are of the same size. *Purpuricella* is somewhat larger than *ostryæella*, and though not so strongly tinged with purple as the female of *ostryæella*, it is decidedly darker. Its food plant is unknown, and certainly its habits of life must differ from those of

ostryæella, for no mine similar to that of the latter is found in this vicinity. The male is nearer in ornamentation to the female *ostryæella* than to the male, being darker, more purplish and lacking the fasciæ. There are slight differences in neuration between the two species, but not greater than are found between different species of *Laverna*, or even *Elachista*, which is perhaps nearer to these species than *Laverna*. But the different phraseology used in the diagnosis of the two genera may perhaps indicate greater differences of neuration than actually exist; though "discal cell long, narrow and closed by an oblique discal vein," which "sends a vein to the hinder margin from a point near the median vein," which (the median) "passes straight to the hind margin," sending "just before the discal vein a branch to the hind margin," (*Chrysopeleia*) is pretty much the same as discal cell narrow and rather acutely closed; and "the median divides into three branches from the apical part of the cell"—(*Ææa*) the difference being that the oblique vein which closes the cell is in the one case considered as the discal vein, and in the other as the end of the median. In both species the head is not only short and depressed, but is almost acutely angled in front. The position and number of the tufts is nearly the same in both species, and is not very accurately indicated by the position of the dots at p. 73, v. 4. The two opposite costal dots should be nearer together, and in *ostryæella* the inner one is a little in advance of the outer one; while in *purpuriella* the first and last are a little further from the two central ones than in *ostryæella*. *Ostryæella* also has two or three minute tufts in the apical part of the wing, which are wanting in the other species. In *purpuriella* there is, *loc. cit.*, said to be an "indistinct confused yellowish fascia about the apical fourth," but in some specimens this is simply represented by a pale ochreous dot before the dorsal ciliæ. Both species should be referred to *Ææa*.

DESCRIPTION OF A NEW SPECIES OF ANISOTA.

BY J. A. LINTNER, N. Y. STATE MUSEUM NAT. HIST., ALBANY.

Anisota bisecta, *nov. sp.*

♀. Head sunken; head and collar tawny. Antennæ short, simple, the joints showing as distinct rings. Thorax robust, globose, elevated in front, and projected over the head more than in *A. bicolor* or in *A. Heilig-*

brodti. Shoulder-covers narrowly bordered above with brown. Abdomen short, not extending beyond the hind wings, concolorous with them.

Primaries rounded, full, much as in *A. bicolor*, but more rounded on the outer margin; pale ochraceous, sprinkled with brown irrorations which are more numerous costally and outside of the transverse line; the latter brown, sharply defined, commencing just before the apex (nearer to it than in *A. bicolor*) and running straight to the inner margin at its middle, or a little nearer to the base. Outside of this transverse line the wing is somewhat darker. Inner margin of wing bordered with brown of the shade of the tr. line, becoming stronger until lost in the long basilar hairs. An indistinct sub-basilar line is indicated by some confluent brown spots, in form and direction similar to that of *A. bicolor*. Cilia interspersed with some brown scales.

Secondaries rounded at the angles and excised costally, more than in *A. bicolor*; without spots, and with no median band; of a paler ochraceous than the primaries, more yellowish toward the outer margin; basilar region bearing some dull reddish long hairs from below the cell to the fold near the inner margin, upon which they attain their greatest extension. Cilia concolorous with the basal portion of the wing.

Beneath, wings of a duller ochraceous. Primaries with the transverse line indicated at the apex by a clustering of the brown dots, and beyond, showing from the upper surface; the brown dots are confined to the costa, the apical and the outer portions of the wing; a diffused brown discal spot.

Secondaries darker ochraceous than above. Costa and costal region thickly sprinkled with dark brown dots. From near the apex, a brown shade curves downward and then inward, losing itself opposite the cell; beyond this to the outer margin the wing is darker ochraceous than elsewhere. No discal spot.

Abdomen beneath concolorous with the outer margin of the secondaries. Tibiæ and tarsi of the anterior and middle legs, lead colored.

Expanse of wings, 3.12 inches; length of body, 0.94 inch.

Habitat, Racine, Wisconsin. One female, captured by, and in the collection of, P. R. Hoy, M. D., of Racine.

This species can at once be separated from all other known American species, by its pale ochraceous color, and the very distinct and oblique transverse band dividing the wing into two nearly equal parts.

It is closely allied, judging from the description and figure in *Trans. Amer. Ent. Soc.*, vol. i., p. 11, pl. i, fig. 2, to the Mexican species *Adelcephala quadrilineata* Gr.-Rob., in the shape of its wings and thorax, the sharply defined, straight and very oblique transverse band, the absence of a median band on the secondaries, and the leaden coloration of the tibiae and tarsi. The more prominent points of difference are, a more distinct sub-basilar band and the transverse band farther removed from the apex on the primaries, and the more extended reddish area of the secondaries in *A. quadrilineata*.

A. bisecta, in all probability, occurs also in Texas. I am informed by Mr. O. von Meske that he has carefully examined an example which had been received from Mr. Boll, of Texas, which he has no hesitation in regarding as the ♂ of the above described ♀. From a very recent inspection of the specimen, he is able to recall its more acute primaries, a deeper yellow color, the transverse line of the same course but stronger, the brown bordering of the inner margin, and a deeper red of the secondaries.

ON CERTAIN HYMENOPTERA.

BY W. H. PATTON, WATERBURY, CONN.

PREDACEOUS SAWFLIES.

On two occasions I have observed *Allantus basilaris* (Say) Nort. ♀ devouring another insect; in one instance the larva of a *Chrysopa*, in the other a small flower beetle of the genus *Phalacrus*. Although no such habit has been recorded previously in regard to any American species, it does not appear to be entirely without precedent among the European members of this family, for, according to Westwood, (Introd., ii., 109) "Various species, however, (*T. viridis*, *scalaris*, etc.) attack and devour living insects which frequent the same plants, as observed by St. Fargeau (Ann. Soc. Ent. France, 1834, p. 11) and Dahlbom (Prod. Hym. Scand., p. 38)." The choice of its prey made by the *Allantus* in the instances

observed does not warrant us in regarding the insect as beneficial, although the predaceous habits and some correlated peculiarities of structure tend to show that the imago may prove to be so. Upon what plant the larva feeds is unknown. The mandibles of *Allantus*, as of many other sawflies, are asymmetrical, the teeth on the right mandible being more acute than those on the left; but the resemblance which they bear to the mandibles of *Cicindela* is very striking and would of itself suggest a similarity of habits.

Of the restricted genus *Allantus* two species occur in the eastern United States, and, as they have not hitherto been clearly defined, I append their distinguishing characters:

1. ALLANTUS BASILARIS.

Tenthredo basilaris Say, Long's 2nd Ex., ii., 316 (1824).

A. basilaris Norton, Bost. Jour. N. H., vii., 240, 9 (1860).

“ “ Trans. Am. Ent. Soc., i., 361 (excl. var.
a ♂) (1867).

♂ ♀. Antennæ short, black; basal joint straw yellow. Markings on legs and thorax clear yellow.

♀. A large yellow spot on meso-pleura.

♂. Abdomen yellow, posterior tarsi black; pleura yellow, pectus pale.

2. ALLANTUS DUBIUS.

A. dubius Nort., Bost. Jour. N. H., vii., 241, 10, ♀ (1860).

“ “ Tr. A. E. S., i., 362, ♀ (1867).

A. basilaris, var. *a*, ♂ Nort., Proc. Ent. Soc. Phila., iii., 10,
18 (1864).

“ “ “ Tr. A. E. S., i., 362 (1867).

♂ ♀. Antennæ longer; ferruginous basal joints generally paler. Markings on legs and often those on thorax piceous yellow.

♀. Meso-pleura black.

♂. Abdomen black, the second, third and fourth segments yellow; posterior tarsi piceous yellow; a small yellow spot on meso-pleura, pectus black.

♂ var. (one specimen). Antennæ black, a pale spot on pectus.

In *dubius* the wings are darker and the size slightly larger; the vertex is more coarsely punctured, not so highly polished, and often it is orna-

mented with piceous markings which are wanting in *basilaris*. There is generally less yellow on the legs, cheeks, collar, scutellum, basal plates and abdomen (*basilaris* ♀ sometimes has spots on the 1st, 2nd and 3rd segments) of *dubius* than of *basilaris*; but these characters vary in both species.

Both species occur in New England from the latter part of July to the latter part of August, *dubius* frequenting the low grounds, *basilaris* the hills.

A RARE XIPHIDRIA AND ITS PARASITE.

XIPHIDRIA ATTENUATA ♀.

X. attenuatus Nort., Proc. Ent. Soc. Phila., i., p. 144 (1862), ♂.
 “ “ Trans. Am. Ent. Soc., ii., p. 354, ♂.

♀. Head and thorax black; tibiæ and tarsi pale; wings hyaline; abdomen red, with six yellow spots. Length 0.40 in.; expanse 0.64 in.

Antennæ 16-jointed, black, piceous beneath, especially towards tip. Face below and between antennæ, palpi and base of mandibles, fulvous. Eyes, except for a short space above, bordered with yellow, the border covering nearly the whole cheek and the anterior and posterior borders extending backwards to meet on the edge of the occiput, thereby enclosing a spot above the eyes which is black in the centre but shading through piceous into the yellow borders. Space about the ocelli finely rugose, with delicate ridges radiating from each ocellus; vertex behind ocelli polished. A pit or deep puncture midway between lower ocellus and the insertion of antennæ. Thorax closely and finely rugulose, scutellum and enclosure on basal plates polished. Tegulæ, minute spots before tegulæ, one each side above anterior wing, and the cenchri, yellow. Trochanters, tips of coxæ and of femora dull yellow; femora piceous, posterior pair black; basal half of tibiæ and basal joints of tarsi, except at tip, yellow; the remainder of tibiæ and tarsi fulvous, becoming brownish on the posterior tibiæ. Wings hyaline, iridescent, nervures and stigma pale piceous. Basal half of the first segment of abdomen black and roughened with fine confluent punctures; the remainder of this segment and portions of the terminal segment are darker than the other segments of the red polished abdomen. A yellow spot on each side of segments three, four and seven, those on the seventh segment being the largest. Sheath of the ovipositor black; abdomen beneath, except at base of ovipositor, red.

One specimen. Connecticut, June 6th, 1873.

Taken from a dead stick of *Betula nigra*. My attention was drawn to the spot by finding a *Rhyssa humida* (Say) with its ovipositor firmly driven into the wood. Upon cutting into the stick, this specimen, together with a pupa of the male and several horn-tailed larvæ, were found. The antennæ of the pupa are bent down upon the sides of the face and up along the back of the head. One of the larvæ changed to pupa (female, length 0.32 in.) on the 21st of July. The male agrees well with Norton's description as given in the Trans. Am. Ent. Soc., and is very unlike the female.

RHYSSA HUMIDA (Say, Bost. Jour., ii., p. 224, female. Walsh, Tr. St. Louis Acad. Sci., iii., p. 108, female).

The specimen differs from Say's description only in minute characters of sculpture and coloration which Say omitted, but which appear in Walsh's more detailed account. From Walsh's description it differs in having no white spot on the metathorax and no "faint, brown cloud in the inner angle of the radial area." The length of body is slightly less than half an inch.

A NEW CATOCALA FROM FLORIDA.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

Catocala sinuosa, n. s.

This species is allied to *C. coccinata*, but very distinct from that and all other described species. Fore wings whitish gray, paler, but lines much as in *coccinata*. The t. p. line has the double sub-equal teeth and the long inward and thicker indentation above internal vein. Hind wings crimson. The median band reduced to a sinuate, unusually narrow and abbreviate fascia which looks like an elongate discal mark rather than the usual band. Hind margin with the black band continuous, not quite attaining anal angle. Beneath largely shaded with bright red on both wings, the black fascia reduced to unusually narrow stripes; on the hind wings discontinued. Abdomen gray. Size of *coccinata*. Very different in character from the Texan var. *circe* of *coccinata*, which seems to intergrade with the type form. Two specimens Florida, Mr. Albert Kæbele.

REMARKS, CRITICAL AND SUGGESTIVE, ON THE GENUS
LIMENITIS EAST OF THE MISSISSIPPI.

BY ROBERT M. GREY, KENWOOD, ALBANY CO., N. Y.

Demonstrations from examples taken by me during the past three years, and from examples taken in Farmington, Conn., twenty years ago, give indubitable evidence that our *Limenitis* are plastic forms of one species, accommodating themselves readily to the environment, assuming colors from climatic effect or different seasons and localities, or for purposes of protection—the form *L. disippus* being mimetic of *plexippus*, as already suggested by authors. My conclusions are drawn from the following observations: Near the Hudson River I find *ursula* and *proserpina* in close association, each partaking of the markings of the other, evidently one brood, alighting on the same heap of pomace; expansion of wings three to three and a half inches. About six miles from the river *ursula* and *proserpina* are equally abundant, with a few *arthemis* and rarely a *disippus*. Expansion of the wings of the four about two and a half inches; all found in one glade. From this to the highest tables of the Helderberg Hills, *ursula* gradually disappears and only *proserpina* and *arthemis* are found, the latter most abundant. In the low lands *disippus*, *ursula* and *proserpina* are only found; in intermediate broken lands *ursula*, *proserpina* and *arthemis* are chiefly found; at the highest altitudes only *proserpina* and *arthemis* are found, and examinations of many examples from the different localities show that these forms approach each other very closely.

In December, 1877, I sent a melanitic form of *disippus* to W. H. Edwards, Esq., for his examination, and in a communication written to Mr. Edwards at the time, I ventured the assertion of all being one species. As Mr. Edwards did not notice it in a future communication, I took it as a gentle way of dealing with an absurdity. From captures made since I am convinced that all our *Limenitis* have one origin. In proof I have in my collection a *disippus* without the division line on secondaries; some with narrow and others with broad mesial lines. In one example the dividing line is extended to a broad band, with blue crescents in marginal, and red lunules in submarginal band. An *arthemis* from the white band to margin is the exact counterpart of it; in one example, on the under surface of secondaries inside of mesial line, are white lunules.

I have a melanitic form of *disippus* with all the markings of *ursula* on the under surface, and an *ursula* that mimics this at the apex of superior wings, and is suffused with tawny red to base of wing. One *ursula* has a bright red under surface, and so on through many examples blending into each other in color, proving all to be of one origin. The larvæ feed on much the same food plants. The larvæ of *disippus* and *ursula* are held by many collectors to be undistinguishable.

ANOTHER BEE ENEMY.

BY A. J. COOK, LANSING, MICHIGAN.

About one year ago I received a small bug from a gentleman in Maryland, together with the information that it was a serious enemy of the honey bee. It was stated that this bug would lie concealed among the flowers, and upon occasion would grasp a bee, and, holding it off at arm's length, would suck out its blood and life. More recently, I have heard of the same insect, with the same habits, in Iowa, Missouri, Illinois, and more recently, through the editor of *Gleanings*, from Minnesota, and later still, from V. W. Keeney, Shirland, Ill. In one case it was stated that the bug had the power, which it was not slow to use, of stinging quite severely. This same insect has been observed by both Prof. W. J. Beal and myself, at this place, resting on flowers, in which it is often almost concealed, awaiting an opportunity to capture and defluidize its prospective victims.

WHAT IS IT?

This is a Hemipteron, or true bug, and belongs to the family *Phymatidæ* *Uhr.* It is the *Phymata erosa*, Fabr., the specific name *erosa* referring to its jagged appearance. It is also called the "stinging bug," in reference to its habit of repelling intrusion by a painful thrust with its sharp, strong beak.

BIBLIOGRAPHY.

This insect is mentioned by the lamented Dr. B. D. Walsh (*Am. Entomol.*, vol. 1, p. 141), who facetiously compares its intelligence with

that of the highest bipeds, who are often ignorant of the difference between a bee and a beetle, nor could they safely grasp the former. Yet this humble bug does know the distinction, and holds the bee well off, so as safely to suck out its substance. On p. 25, vol. 2, of the same work, this insect is briefly described and its habits given. Dr. A. S. Packard speaks of this stinging bug, in the *American Naturalist*, vol 1, p. 329, and also in his Guide to the Study of Insects, p. 552, where the insect is figured. Mr. Townend Glover, late of the Agricultural Department, in his beautiful work on the Hemiptera, p. 57, has described the habits of this bug, and has given three figures of it, Plate III., Fig. 13. Prof. P. R. Uhler, our greatest American authority in this sub-order, in "Hemiptera West of the Mississippi," p. 58, speaks of the habits of the *Phymata erosa*. In the current volume of the *Country Gentleman*, p. 551, the able entomological editor, Prof. J. A. Lintner, in response to a correspondent, gives a brief account of the habits, etc., of this same insect.

DESCRIPTION.

The "stinging bug" (Fig. 1) is somewhat jagged in appearance, about three-eighths of an inch long, and generally of a yellow color, though



FIG. 1.—Side view, natural size.



FIG. 2.—Magnified Twice.



FIG. 3.—Beak, much magnified.

this latter seems quite variable. Frequently there is a distinct greenish hue. Beneath the abdomen, and on the back of the head, thorax and abdomen, it is more or less specked with brown; while across the dorsal aspect of the broadened abdomen is a marked stripe of brown (Fig. 2, d, d). Sometimes this stripe is almost wanting, sometimes a mere patch, while rarely the whole abdomen, is very slightly marked, and as often we find it almost wholly brown above and below. The legs (Fig. 2, b), beak and antennæ, a) are greenish yellow. The beak (Fig. 3) has three joints (Fig. 3, a, b, c) and a sharp point (Fig. 3, d). This beak is not only the great weapon of offence, but also the organ through which the food is

sucked. By the use of this, the insect has gained the soubriquet of stinging bug. This compact jointed beak is peculiar to all true bugs, and by observing it alone, we are able to distinguish all the very varied forms of this group. The antenna (Fig 4) is four-jointed. The first joint (Fig. 4, a) is short, the second and third (Fig. 4, b and c) are long and slim, while the terminal one (Fig. 4, d) is much enlarged. This enlarged joint is one of the characteristics of the genus *Phymata*, as described by

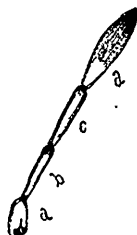


FIG. 4—Antenna, much magnified.



FIG. 5—Anterior Leg, magnified—exterior view.

Latreille. But the most curious structural peculiarity of this insect, and the chief character of the genus *Phymata*, is the enlarged anterior legs (Figs. 5, 6 and 7). These, were they only to aid in locomotion, would seem like awkward, clumsy organs, but when we learn that they are used to grasp and hold their prey, then we can but appreciate and admire their modified form. The femur (Fig. 5, b) and the tarsus (Fig. 5, a) are



FIG. 6—Interior view.

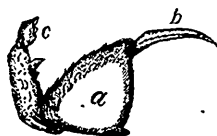


FIG. 7—Claw extended.



FIG. 8—Middle Leg—much magnified.

toothed, while the latter is greatly enlarged. From the interior lower aspect of the femur (Fig. 6) is the small tibia, while on the lower edge of the tarsus (Fig. 6, d) is a cavity in which rests the single claw. The other four legs (Fig. 7) are much as usual.

HABITS.

This insect, as already intimated, is very predaceous, lying in wait, often almost concealed, among flowers, ready to capture and destroy unwary plant lice, caterpillars, beetles, butterflies, moths, and even bees

and wasps. We have already noticed how well prepared it is for this work by its jaw-like anterior legs, and its sharp, strong, sword-like beak.

Mr. Keeney says he caught the one he sent on golden rod. This plant, from its very color, tends to conceal the bug, and from the very character of the plant—being attractive as a honey-plant to bees—the slow bug is enabled to catch the spry and active honey-bee.

VERDICT.

As Prof. Uhler well says of the "stinging bug": "It is very useful in destroying caterpillars and other vegetable-feeding insects, but is not very discriminating in its tastes, and would as soon seize the useful honey bee as the pernicious saw-fly." And he might have added that it is equally indifferent to the virtues of our friendly insects like the parasitic and predaceous species.

We note, then, that this bug is not wholly evil, and as its destruction would be well-nigh impossible, for it is as widely scattered as are the flowers in which it lurks, we may well rest its case, at least until its destructiveness becomes more serious than at present.

TO OUR ASSOCIATE MEMBERS.

By referring to the second page of the cover of the present issue, it will be seen that the yearly fee for associate members of the Entomological Society of Ontario has been reduced—those residing in the United States to one dollar, those in Great Britain to four shillings sterling. We sincerely hope that this reduction will result in a considerable increase in our membership. Our journal is doing a good work and we are anxious to enlarge the sphere of its usefulness. If each one of our members will exert themselves a little and send in their own and as many additional subscriptions as they can obtain, they will greatly aid us in our endeavors to further the interests of Entomology.