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The Canadian Entomologist.

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ON THE EARLY STAGES OF *PLUSIA PRECATIONIS*, GUENÉE.

BY D. W. COQUILLET, WOODSTOCK, ILL.

EGG.—Flattened-globular or button-shaped, sometimes with an impressed spot in the centre of the upper side; upper part grooved, grooves narrow, interspaces roughened; milky white; transverse diameter about $\frac{1}{2}$ m. m.

LARVA.—*First stage*: Body deep green, two dorsal, a subdorsal and stigmatal white line, the latter the most distinct; piliferous spots green, usually tipped with black, each bearing a short black hair; venter deep green, unmarked; head pale green. Provided with only 12 legs.

Second stage: Same as first, and with an indistinct whitish line on the dorsal space; subdorsal space usually tinged with black.

Third and last stage: Same as second; body robust, tapering anteriorly; length at maturity $1\frac{1}{4}$ inches.

CHRYSLIS.—Of the usual shape, blackish brown, terminates behind in a short, thick, cylindrical projection, rounded behind and tipped with one or two small hooks; antennæ and leg cases project beyond the wing cases in the form of a small bulb; length from 13 to 15 m. m.

In the larvæ of this brood I observed only two moults, and if there is a greater number of moults than this they probably occur prior to the first moult mentioned above. Just before moulting the larvæ left their food and collected on the ceiling of their cage.

In some of the captured larvæ which I have reared the piliferous spots were sometimes entirely black, or had a black basal annulation; sometimes the head was surrounded with black, or had a black streak on each side; in many of them all of the white lines, except the stigmatal, were obsolete.

On the 17th of May, 1880, I enclosed a female *precationis* in one of my breeding-boxes in which some grass, clover and plantain were growing. In the afternoon of the next day she laid about 50 eggs, placing them singly, or in small rows or patches, on both the upper and under sides of

the grass and plantain leaves, seldom placing more than five eggs in one cluster. Shortly after hatching the larvæ ate the parenchyma of the blades of grass, leaving the veins untouched; after increasing somewhat in size they fed upon the plantain leaves. The first larva of this brood began spinning its cocoon on the evening of June 16; it became a chrysalis June 19, disclosing the imago June 28. The chrysalis could easily be seen through the thin cocoon. When this larva began spinning its cocoon the other larvæ of the same brood, hatched out at about the same time and reared under precisely similar conditions, were of all sizes from those only one-half grown to those nearly full grown. As they appeared to be costive, I supposed that it was caused by a lack of water; accordingly I wet a few leaves and fed them to the larvæ, shortly after which they were taken with a violent scouring, which so reduced them that all but one died; this one spun its cocoon and went on to chrysalis, but died before producing the imago.

On the 6th of July following I obtained another laying of eggs, and the larvæ from these showed the same variation in size as those of the first brood. When some of them became nearly full grown they were attacked with a disease which caused them in a short time to turn black; if handled after death the skin readily broke, showing the interior to be filled with a blackish liquid. As soon as this disease made its appearance I removed the healthy larvæ to new breeding-cages, but they all finally died of this disease.

On the 23rd of April, 1879, I obtained a larva of this species which spun its cocoon the next day, disclosing the imago May 20; the earliness of the date precludes the possibility of its having issued from the egg the same season. It was taken while feeding upon dandelion leaves; I have taken other larvæ of this species upon the leaves of burdock and plantain. Prof. G. H. French states* that they also feed upon the leaves of the thistle and hollyhock, but I have never taken them upon either of these plants. I have seen caterpillars which did not differ materially from those of *precatonis* feeding upon cabbage leaves, and the *precatonis* larvæ in my breeding-cages fed readily upon these leaves. As there is so much difference in coming to maturity among the larvæ of the same brood, it is evident that no given number of broods are reared in one season by all of the members of this species; four broods in a season seem to be the maximum number, while the average number is probably three.

* Seventh Report St. Ent. Ill., p. 229.

In the afternoon of June 29, 1880, I saw a female *precationis* depositing her eggs; these she placed singly on the leaves of grass and low weeds, seeming to have no preference for any particular species of plant. This diurnal habit of the moth seems to be a well established one, for I have frequently seen them taking food from clover blossoms in the day time, and the moth from which I obtained the first laying of eggs was captured while hovering around lilac blossoms at mid-day when the sun was shining brightly. In vol. xi., page 108, of the CANADIAN ENTOMOLOGIST, Mr. W. L. Devereaux also records the capture of a *precationis* on the 1st of June "at lilac blossoms in the day time."

Precationis is very abundant in this locality, frequenting clover meadows in company with *Drasteria erecta* and *Hypena scabra*. When flushed it flies a short distance with a graceful, undulating motion, and then alights in plain view without any attempt at concealing itself; after alighting it sometimes elevates its wings and vibrates them very rapidly.

Below is given in a tabular form the time occupied by this species in its different stages:

From deposition of egg to hatching.....	4 to 6 days.
“ hatching to first moult.....	14 “
“ first to second moult.....	3 “
“ second moult to spinning cocoon..	5 “
“ spinning cocoon to chrysalis.....	3 “
“ chrysalis to imago... ..	9 to 23 “

NOTES ON SOME NOCTUID LARVÆ.

BY. G. H. FRENCH, CARBONDALE, ILL.

Mamestra trifolii, Esp.

Length when full grown 1.10 inches. In shape and appearance very much like the larvæ of *Agrotis lubricans*. Color uniform grass green marked as follows: a rather broad substigmatal line of creamy white, having at times a slightly pinkish tinge; a dorsal line of dark green. There is no trace of a subdorsal line except that the place of that line is a very little lighter on the first three joints when the larva is crawling. Stigmata narrowly edged with black. Head rather small, a little paler than the body. Piliferous spots very small.

Two of these were found in my garden hid among some weeds, June 29, 1880. After putting them in the rearing box one died, the other changed to a chrysalis July 5th, and produced the imago July 18th.

Prodenia lineatella Harvey.

Length 1.35 inches. Shape of body cylindrical, very much like the larvæ of *Agrotis*. Dorsal, subdorsal and substigmatal lines, and a line in the middle of subdorsal space, pinkish lilac. In the dorsal space there are, first a series of oval dark brownish drab spots, the broadest part occupying the centre of each joint, the several spots connecting with each other at the union of the joints. In width they extend two thirds of the distance from the dorsal to the subdorsal lines. On the subdorsal rests a series of either triangular or somewhat oval velvety black spots, one to each joint on each side of the body. These spots extend inward half way to the dorsal line, thus encroaching somewhat upon the drab spots. At the base of each black spot, next the subdorsal line, is a narrow, bright yellow, semi-elliptical spot. The rest of the dorsal space is gray irregularly striped with fine white. The upper half of subdorsal space is pinkish gray irregularly striped with fine black; the lower half black, similarly striped with fine light lines. Substigmatal space and venter carneous gray, the first spotted with white. The head and cervical shield are black, the inverted Y white.

The single larva from which the above description was taken was found in my garden August 20th, 1880, in a bed of salsify. While in confinement it ate readily of the leaves of salsify, peach and raspberry. August 25th it disappeared for pupation, and the imago emerged September 11th.

Leucania pseudargyria Guen.

Length one inch. General color fleshy brown, sprinkled over with dark brown. Dorsal line narrow, of general ground color; this and the subdorsal and substigmatal distinguished by not being sprinkled with brown. The dorsal space dark brown, composed of dark brown dots finely sprinkled over the surface. About midway this is partially separated as though forming two dark lines. There is a slight massing of these brown dots from the posterior part of the joint, near the dorsal line, outward forming an indistinct V. Subdorsal space much like the dorsal only lighter. Substigmatal space with few dots, a brown patch at the

base of each pro-leg. Head of the same general color as the body, mottled with brown. Cervical shield dark brown, small. Piliferous spots small, brown.

Two of these were found, one of which died from the effects of parasites. The other, found March 8th, changed to a chrysalis March 21st, on the top of the dirt in its box, under some dry grass, without a cocoon. The moth emerged April 18th. They were taken in situations indicating that grass constituted their food, and ate only that while in confinement.

Mr. Caulfield has given us a description of this larva in Vol. 6, page 132 of the Can. Ent., but as my specimens varied some from his, I thought it well to give what I have above.

ON THE EARLY STAGES OF GRACILARIA STIGMATELLA, FABR.

BY V. T. CHAMBERS, COVINGTON, KY.

As elsewhere stated, the species formerly described by me as *Gracilaria purpuriella* is *G. stigmatella* Fabr. In the Natural History of the Tineina, vol. viii., p. 35, Mr. Stainton gives the following account of it: "The larva feeds in and upon willows, sallows and poplars. On the white poplar I have had an opportunity of observing the mine of the young larva, which is a *small blotch not very unlike the mine of a Lithocolletis larva*. (Italics my own.) As soon as it quits this mine, which it does at an early period of life, it rolls up a piece of the tip or edge of the leaf in a conical form, and it feeds on the interior of this cone, eating half through the substance of the leaf; as one of the cones does not afford sufficient sustenance for the larva during its whole existence, it treats in succession several leaves in this fashion, and the deserted cones always contain a considerable amount of excrement. On the white poplar the conical form of the habitation is not so marked, and sometimes it rolls over a piece of the edge of the leaf. When the larva is quite full fed it turns down a corner of a leaf, or else fixes itself straight over the midrib, and there spins its tough but glossy-looking cocoon, from which in a *few weeks* (italics mine) the perfect insect emerges." This is the most complete account of the larva of this species that I have seen; and I quote

it that the reader may compare it with my own observations as hereinafter detailed. The only point in which my observations differ essentially from those of Mr. Stainton, is that I find the duration of the pupa state as hereinafter shown to be only one week, instead of "a few weeks," but this may perhaps be accounted for by difference of season or temperature.

Partial life histories of many species of Tineids have been heretofore published, but very few full or detailed ones ; and the only attempt at a complete history of any species of *Gracilaria* that I have met, is Mr. Healy's account of the larva of *G. syringella*, in the Entomologist's Monthly Magazine, v. iv., p. 150, *et seq.*, and unfortunately I have seen only the last two parts of it ; and therefore I do not know what account he gives of the structure of the mouth parts, nor of the ecdysis in the earlier stages of the species. Mr. Healy states that *syringella* frequently goes under the ground to pupate, and in this respect it appears to be singular in this genus, but probably it only does this in confinement. His account of its manner of rolling and fastening the leaf and of making its cocoon is characteristic, I think, of the larger species of this genus—the true *Gracilaria*. I infer from Mr. Healy's concluding remarks (*loc. cit.* pp. 176 and 197) that *syringella* passes through only four larval stages. Thus he states that when the larva first leaves the mine "it crawls to the under side of another leaf, the tip of which it rolls downward ;" that "after a few days residence in the rolled leaf the larva moults for the second time." My observations on *stigmatella* and other species of the genus lead me to the conclusion that there are two moults in the mine, and that the moult which Mr. Healy calls the second is really the third ; and that the first stage, and first moult of *syringella* (in which it has trophi of what I have elsewhere denominated the "first form," and membranous thoracic feet) escaped his observation. Mr. Healy only mentions two other moults later than that which he calls the second, making according to his account only four larval stages. But the species whose larval history I have observed (*stigmatella*, *rhoifoliella*, *robiniella* and *salicifoliella*) all have five larval stages ; and in the first stage all have the trophi and feet as above stated, so that I think it probable that the first moult, which takes place when the larva is not more than 85 m. m. long, escaped Mr. Healy's observation. But as above stated, I have not seen the first part of his paper.

Mr. Stainton mentions a slight difference between the habits of *stigmatella* when found on "white poplar" and when found on willows ; that is, the

cone was more regular on the latter. I have observed the same difference between those found on willows and those found on silver-leaf poplars and cottonwoods. I attribute it to the size and stiffness of the poplar leaves. I have never met with the larva on the weeping willow. But to return to its life history.

On the morning of Saturday, July 10, I found on a leaf of cottonwood (*Populus monilifera*) a narrow white line about one-half inch long, which was at once recognized as that of this species in a very early stage. On holding the leaf up in the sunlight the larva was visible in the mine; it was flat, had membraneous, unarticulated and unarmed thoracic legs and mouth parts of the "first form," with the head and thoracic segments a little wider than the abdominal segments, and looked very much like a *Lithocolletis* larva of the flat group in the same stage. (Nevertheless a practiced eye will distinguish a *Lithocolletis* from a *Gracilaria* larva even in this stage.) It was less than 8 m. m. long, and as I infer from many observations on these small larvæ and their mines, it was but a few hours, probably about twelve hours from the egg. It extended the mine until it was about 1.9 m. m. in length, and scarcely wider than the body of the larva, and the mine looked like a portion of a *Phyllocnistis* mine; then it made a few digitate lateral branches, and the mine resembled a young mine of *Gracilaria robiniella* in locust leaves; then it connected these branches so that the mine became an irregular parallelogram about 1.9 m. m. long and 6 m. m wide; and now, as stated by Mr. Stainton, the mine was not unlike a young *Lithocolletis* mine, or a white blister on the leaf. Like all larvæ with trophi of the first form, it ate only a layer of cells beneath the cuticle, not burrowing down into the pareuchyma. On Tuesday evening, July 13th, about three to three and one-half days after it left the egg, I found that it had very recently moulted whilst still in the mine and that the body was now nearly cylindrical, that it had trophi of the second form, and articulated thoracic legs each armed with a claw. On Friday evening, July 16th (the larva now being about seven days, within a very few hours, more or less, old) it was still in the mine, but not feeding, and I think it had just moulted (2nd moult); but at an early hour the next morning it had left the mine and was found on the leaf near to the mine, and not feeding. I think it had very recently quitted the mine. Three hours afterwards I found that it had gone to the tip of the leaf which it had rolled up and was feeding in the roll; and on opening the mine two exuvæ were found in it, one of which had the head and

trophs of the first form, and the other and larger one of the second form. It had therefore been in its mine within a few hours, more or less, of seven days, and had undergone two moults there. On the next Friday, July 23rd, I found that the larva was not feeding, so I unrolled its cone and found in it two more casts, one of which was still fresh. Here were therefore two moults *within* the week, making four in two weeks from the egg, and the larva was a little more than half grown. It eats much more and grows much more rapidly in its last stage. When taken from its roll, as just stated, it was placed upon a fresh leaf, where in a little while it had curled up the edge of the leaf, fastening it all around by a web instead of by the little cords as in its first roll. On Monday morning early, July 26th, it was still in its roll, but three hours later it had left the roll and begun its cocoon at the edge of the leaf. This is unusual, as the mine when the larva is free is placed over the midrib. The contraction of the silk curled the edge of the leaf over the cocoon. The pupa was disclosed early in the morning of the 28th July, about two days after the cocoon was begun, but less than a day after the cocoon was finished; the four previous moults each occupied about twelve hours, as I was able to determine approximately by observing whether or not the larva was feeding. There are thus five larval stages. The entire larval life before beginning its cocoon is about seventeen days, within a few hours more or less, giving nineteen days as the entire larval life. This is about the length of larval life in *Lithocolletis* and *Leucanthiza*. That of *Phyllocnistis* is not known; that of some species of *Nepticula* (a genus very far removed from the others above named) is sixteen days in some species, only a week in some others, and probably even less in some others. In the larva whose history I have given above the imago was disclosed Aug. 4th, so that the pupa state lasted just a week, or just twice as long as any single larval state. The same rule holds in *Lithocolletis* and *Leucanthiza*. In *Phyllocnistis* we do not know the length of the larval stages, but the pupa state lasts eight days. I refer only to the summer broods, of course. In some species of other genera, as *Nepticula pteliaella*, not yet described, the first and second larval stages each last three days, whilst the third (and last one) lasts just twice as long—six days, and has just double the rate of growth, so that it looks as if a regular moult had been skipped. Is the pupa state likewise the equivalent of two larval stages?

ON A LATELY DESCRIBED SPECIES OF LIMENITIS.

BY H. STRECKER, READING, PENN.

Mr. W. H. Edwards' *Limenitis Eros* published in the Dec. (1880) No. of Can. Ent., p. 246-251, is the same insect described by myself two years since in the Synonymical Catalogue, p. 143, as follows: *Limenitis Misippus* "var. a. FLORIDENSIS, nob.—The form found in Florida and other parts of the extreme south. Whilst our more northern form is of the same color as *Danais Plexippus*, this southern variety exactly mimics in its dark coloration *Danais Berenice*, with which it associates." From this I think it will be seen that Mr. Edwards was in error in his supposition that *Floridensis* was different from *Eros* and indicated a species with dark upper surface and pale under side of secondaries, as neither in the place above cited nor anywhere else have I made any such statement or said anything that would lead to such a supposition. My types were sent to me from Apalachicola, Florida, by Dr. A. W. Chapman, a number of years since, and they are as dark below as above, or at least the difference in shade is so little, if any, that it takes the closest examination to detect it; had there been any perceptible difference between the color of the upper and lower surfaces, or between the primaries and secondaries on either surface, I should have mentioned it in my description, which, though brief, I think was sufficiently to the point in regard to color when I said "this southern form mimics in its dark coloration *Danais Berenice*," which latter, as is well known, is of the same color on both upper and under surfaces. I believe now as I did at the time I described this form, that it is only a southern variety of *Misippus* found in southern Alabama, Mississippi and Florida (I once received it from New Orleans, La.) Even the differences in the processes in the three cuts accompanying Mr. Edwards' paper are not greater between (fig. a) the one representing *Floridensis* (his *Eros*) and any one of the other two representing the type form of *Misippus* (*Disippus*) than between the two latter (figs. b. c.) And as regards any difference in the larvæ, I do not see why a variety or aberrant form is not as likely to differ from the type in the earlier stages as it is in the imago.

The form that Mr. Edwards mistook for *Floridensis*, of which he writes as being "almost as dark as *Eros* on upper side" and in which "the under side of secondaries is but little darker than in many northern examples," is entirely unknown to me; out of hundreds of *Misippus*

(*Disippus*) which I have seen I never detected one that answered to such a description; all that I have seen belong either to the common pale tawny typical *Misippus* or the southern dusky var. *Floridensis* (*Eros* Edw.); excepting the two monstrosities *nigra* and *Pseudodorippus*, which are neither species nor permanent varieties, but mere freaks of nature.

Reading, Jan'y 13, 1881.

ON A NEW SPECIES OF PACKARDIA.

BY L. W. GOODELL, AMHERST, MASS.

For several years I have had in my collection, among other undetermined specimens of Bombycidae, a species of *Packardia* which did not seem to agree with any of the published descriptions that were accessible to me. Mr. Grote, to whom I lately submitted the specimen, kindly informs me that it is as yet undescribed.

PACKARDIA NIGRIPUNCTATA, n. sp.

1 ♀. Fore wings light bronzy brown; a narrow, oblique, nearly straight, dark brown band runs from near the inner margin outward to a little beyond the middle of the costa, where it is joined at a right angle by another band which is short and curved, terminating at about one-third of the distance from the costa to the inner angle. Between the end of the short band and a little outward and above the internal angle, is a curved row of three roundish black dots, of which the marginal one is three times larger than the inner and twice as large as the intermediate one. The bands and spots form a distinct inverted V. Within the area thus formed and parallel with the inner band is a brown line which extends from the inner margin to the discal end of the short curved band. This line is a shade lighter in color than the bands and is edged outwardly with very pale or whitish brown. There is a band of the same pale brown or whitish color which includes the black dots and extends outside of the short curved band to the costa. It is constricted near the inner dot, widening rapidly towards the costa, along which it extends towards the base to a little beyond the middle. Hind wings paler, the apex and outer margin concolorous with the fore wings. Fringe of all the wings pale silky brown interlined near the base with darker brown and with a black

spot on the apex of the primaries. Fore wings beneath uniformly a little darker than above. Hind wings beneath much as above, but the darker shade of the exterior margin and apex is not so distinct. The wings above and beneath have the peculiar silken lustre common to the genus. Head, thorax and abdomen ochreous brown. Legs grayish brown, the tarsi a little paler. Length of body 7 mil. Expanse of wings 20 mil.

The wings are not so broad as in *geminata* and *albipunctata*.

Obtained from a larva found on oak in Amherst. I very much regret that I neglected to take a detailed description, but as near as I can recollect the larva was oval or boat-shaped in form. green with several longitudinal rows of minute white papillæ or spots. The cocoon was round and hard and the moth emerged June 20.

ADDITIONAL NOTES ON THE GENUS ANTIGASTER OF WALSH.

BY L. O. HOWARD, WASHINGTON.

In the light of Professor Riley's recent criticism (American Entomologist, December, 1880,) upon my conclusion that *Antigaster* Walsh is synonymous with *Eupelmus* Dalm., I have gone over the ground again with his objections before me, and still adhere to my original view. The objections may be summed up as follows :

1st. *Antigaster* has 10-jointed antennæ; *Eupelmus* (according to Westwood) has 13.

2nd. The club is obliquely truncate from beneath with *Antigaster*, while (according to Westwood) it is ovate with *Eupelmus*.

3rd. The first tarsal joint of the middle tibiæ is "widened and dentate" with *Antigaster*, and simply "furnished with bristles" (according to Walker) with *Eupelmus*.

4th. The abdomen is widened behind with *Antigaster* (? with *Eupelmus*).

It is a very easy matter to show, in regard to the first objection, that the discrepancy in the number of antennal joints arises simply from the

method of computation. Counting the club as one joint and omitting the "annular" joint between 2 and 3, the antenna of *Eupelmus* would count as 10-jointed (see figure of antenna of *E. Geeri* Dalm., Walker's Notes, p. 76, and also antenna of *E. cecreanus* Rondani, Bull. Soc. Ital. Ent., 1877, ii., pl. iv., fig. 122). Applying the ordinary method of computation to the antenna of *Antigaster*, it will be seen to be 13-jointed. The identity of the two is readily seen from the accompanying figure, *b* representing a camera lucida sketch of the ♀ antenna of *Antigaster*, and *a* a reproduction of Walker's figure of *Eupelmus Geeri*.

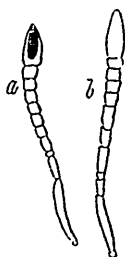


Fig. 3.

With regard to the second objection, an oblique truncation of the club is seen in Rondani's figures of *E. cecidomyinus* and *E. circinantis* (ibid, figs. 147 and 150), and also slightly in Walker's figure reproduced above; so Westwood's definition, "club ovate," does not hold with acknowledged European species.

3rd. The character quoted from Walker (translated by him from Foerster) is incomplete as applying to *Eupelmus*, as Thomson (Hym. Scand. iv., 103) says, "tarsis ♀ semper dilatatis." That the "bristles" of Walker (Foerster) are identical with the "dentations" seen with *Antigaster*, seems most probable from the fact that Foerster, in his figure of *E. Geeri* (Beitr. z. Monog. d. Pteromal., pl., fig. 3) shows projections on the middle tarsi altogether too stout for "bristles"; and also from the fact that the term "rigid pectinations" of Rondani would apply very well to the dentations of *Antigaster*. These are really but a higher development of the strangely modified bristles seen upon the middle tarsi of some Encyrtinæ, notably of *Comys*.

4th. A glance through a number of descriptions of European species of *Eupelmus* shows that the shape of the abdomen varies from the "abdomen lanceolate" of *E. subvittatus* (Walker's Notes, p. 83) to the "abdomen increasing in breadth from base to tip" of *E. pezomachoides* (ibid, p. 82). So the fourth objection will not hold.

Walker's recognition of *Antigaster* in 1869 certainly amounted to but little, since he entirely omitted it from his generic synopsis in 1872.

I would state in conclusion, as a confirmatory evidence of my view, that, since the American Entomologist article appeared, in looking over a list of Chalcids identified for me by Dr. Mayr, of Vienna, I find that

specimens of *A. mirabilis*, sent him without name, are entered upon the list as *Eupelmus* sp.

Taking all these facts into consideration, it seems to me quite plain that *Antigaster* should be dropped.

NORTH AMERICAN MOTHS.

BY A. R. GROTE.

(Continued from Page 17.)

Botis lethalis, n. s.

Allied to *atropurpuralis*. Fore wings purple brown to the exterior line, which is distinct, nearly straight, a little bent submedially, dark brown followed by a whitish coincident shade line. Subterminal space pale brown, shaded with whitish. A terminal whitish shade before the broken terminal line. Fringes dull pale brown, interlined. Hind wings pale fuscous, with an extra mesial line apparent inferiorly, bent before anal angle, followed by a pale shade. A fine black terminal line; fringes pale, interlined. Beneath the ornamentation of primaries repeated. Hind wings pale, with a narrow mesial line bent before anal angle. *Expanse* 16 mil. *Hab.* California.

Botis vacunalis, n. s.

Allied to *dasconalis*. Fore wings and thorax pale yellowish white without markings. Hind wings pure white, immaculate, with a dotted exterior black line, only partially continued; a terminal row of dots at the base of the white fringes. Beneath the primaries are whitish, with the veins marked with fuscous and a transverse extra discal fuscous line. Abdomen white. *Expanse* 24 mil. *Hab.* Sierra Nev., Calif., Mr. Hy. Edwards, No. 3,001.

Botis turmalis, n. s.

♂. This species has a casual resemblance to *Nomophila noctuella*. Pale dusty ochrey. The costa of primaries broadly washed with blackish brown, absorbing the rather large dark discal spots. An exterior dotted line. A terminal series of blackish dots. Hind wings with a terminal

dotted line before the fringes and an extra mesial dotted line more apparent beneath. A discal dot. Beneath the veins are slightly marked with fuscous and the markings of the upper surface are repeated. Fore wings long, apices pointed, exterior margin oblique. *Expanse* 27 mil. Colorado Rio, Prof. Glover, Aug. 24.

Botis rufifimbrialis, n. s.

Allied to *sumptuosalis*, but the fringes are reddish fuscous cut with deep red. Fore wings purple red over blackish; the costal region and terminal space being very dark. The two discal spots are small and black and difficult to make out; there is a yellow dot between them. Two dark yellow bands cross the wing; the inner oblique, not continued on costal region, not very distinct; median space inferiorly with scattered yellow scales. The outer yellow band is broken into a rather large spot opposite the disc and appears again as a short waved line above internal margin. Hind wings blackish, sub-transparent, with red stained fringes and an abbreviate yellowish line. Abdomen fuscous above, pale beneath; legs, pectus and under side of palpi pale or whitish; palpi and thorax above dusky. Wings beneath paler than above, especially the secondaries at base, within a darker marginal shade. *Expanse* 16 mil. Mass., Mr. L. W. Goodell.

Botis flavinotalis, n. s.

Allied to *octomaculalis*. Wings black, the fore wings sprinkled with sulphur yellow scales, forming streaks at the base. Fore wings with two sulphur spots, one irregularly rounded over the median nervules, the other at the end of the cell narrowing to costa. Hind wings with two mesial sulphur spots, the lower elongate. Fringes pale. Abdomen finely ringed with yellow. Beneath the spots are whiter; on the secondaries the mesial spots are surmounted by one on costa. At base on both wings the pale yellow color appears as blotches or streaks. Breast and head with powdery yellowish scales. Thorax black with fine yellow lines bordering the tegulae. *Expanse* 20 mil. Pennsylvania, Mr. Hy. Edwards. The species has a false appearance of a *Melicleptria*.

Botis annaphilalis, n. s.

Fore wings dark gray with a large brown suffused spot below the black reniform. Ordinary lines obsolete; fragments of the subterminal line appearing at internal margin and below costa as black marks. Inner line

faintly visible. Hind wings faded reddish orange with fuscous fringes, with a black line slightly waved at their base. Fringes of fore wings blackish with pale dots. Beneath both wings orange, fringes fuscous; on primaries a discal streak and a spot above on costa. Body dusky gray; abdominal hairs somewhat orange; beneath paler, somewhat whitish. *Expanse* 27 mil. Havilah, Cal., Mr. Hy. Edwards. This species has the false appearance of an *Annaphila*. It is easily recognized, and seems allied to *fodinalis* Led.; it is as large but very different in colors and ornamentation.

Crambus undatus, n. s.

Allied to *exsiccatu*s, but smaller, with the lines without the submedian indentation. Pale whitish gray over light brown, a whitish shade from base along the centre, the wing with scattered fuscous scales. The two fuscous brown lines are very distinct, sub-parallel, near together, well removed outwardly, jagged, angulated below costa, the inner line a little more inwardly oblique and irregular below the cell than the outer. A fine dark line at the base of fringes, which latter are interlined and metallic at the tips. Hind wings pale with a subterminal line feebly marked on both surfaces. Fore wings fuscous beneath with the lines indicated. *Expanse* 21 mil. California, Mr. Hy. Edwards, No. 4454.

Catocala grynea var.

Mr. A. Conradi has collected near Bethlehem, Pa., a singular aberration of this species in which the black bands on the under surface are very broad and the secondaries above almost entirely black, except a yellow spot at base and two more beyond the middle of the wing.

NOTES UPON CLIMATIC INFLUENCES ON SAMIA GLOVERI
OF UTAH AND S. CEANOETHI OF CALIFORNIA.

BY A. H. MUNDT, FAIRBURY, ILL.

The summer of 1879 was quite warm and dry in Utah as well as California. This was very disastrous to the larvæ of *S. Gloveri*, which, it is well known, feed on the willows in Utah growing in or near swamps or near creeks in canons.

That year more than half of the cocoons received during the winter were dead ; many of the larvae had but half changed, *i. e.*, half was still larva, the other half (generally the lower) had already changed to pupa, and in most cases, with the larval skin still clinging about it, in a few partly split open at the back, thus exhibiting the pupa in part. Some, in fact, thus received were alive in that curious condition until spring ; very few of the living pupae were of the proper size. The collectors had also much trouble in gathering them.

However, while *Gloveri* under such conditions did not thrive well in Utah, *ceanothi* in California made splendid cocoons, and but very few, comparatively, did not produce fine imagoes, while most of the *Gloveri* that did hatch were crippled.

This season, 1880, the weather seemed quite the reverse of 1879 ; the atmosphere was more damp, and cocoons received during this winter from Utah are very much larger, heavier and healthier in appearance than in the former ; in several large lots received but very few were not good, and the collectors in the winter of this season had less trouble in obtaining them and were only prevented from gathering large quantities by the deep snows occurring in Utah this winter.

The change with *ceanothi* was this season again the reverse, as my correspondents write me frosts occurred nearly every morning in those portions of California quite late in the summer, the result being that *ceanothi* was very late and also scarce, and the cocoons very much smaller compared with the previous season, and many of these were no good. Larvae received from Mr. Baron, arrived Sept. 10th, were not half as large as those I had raised here in a moderately tempered but well ventilated brick building.

Certain it is, however, that localities may be found in seasons of general scarcity, in valleys or protected by surrounding hills or woods, where certain species may be found in great abundance and in fine condition.

With many experiments I have tried for three seasons, I am convinced that cocoons of *Gloveri* should be kept in a cool place in winter (freezing will not hurt them), or they will hatch cripples, if alive at all ; while *ceanothi* should be kept in a place neither too warm nor dry, but not too cold, until the spring season is well upon us.

That *Gloveri*, *ceanothi*, *columbia* and others of that family are originally of one form, whether *ccropia* or some other species, I have no doubt ; of course climatic and food changes, for many generations, as is well known

in other departments of zoology as well as botany, have brought about great changes. I have had no trouble in crossing ♂ and ♀ *Gloveri* with *ceanothi*, *cecropia* and *ceanothi*, and *Gloveri* and *cecropia*, and have now in my possession some fine cocoons of such hybrids between *ceanothi* and *cecropia*, of which I will speak after the imago appears.

ENTOMOLOGICAL NOTES.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Cecidomyia spec.* on *Aristolochia siphoc.*

Flat rounded galls on the under side of the leaves, pale, somewhat transparent, pale greenish, 4 mil. diam. On the upper side of the leaf the gall becomes a slightly elevated disk marked with dark red and having in the middle a small pale-bordered hole. The galls grow larger and more globular on the stems of the leaves, to globes of 8 mil. diam., some more elongated, 18 mil. long and 8 mil. broad. The larvæ are brick red, 3 mil. long, very agile. I find no species on *Aristolochia* described by Osten Sacken and others.

2. Caterpillar of *Papilio philenor* on *Aristolochia siphoc.*

I received a number nearly full grown, and young ones (about 10 mil. long). Harris, Ent. Corresp., p. 147, discovered them on the same plant in the botanical garden in Cambridge, August, 1840, and Mr. Scudder, List of N. Engl. Butterflies, p. 162, says "once or twice taken in Eastern Mass. last September." I don't know if the species is taken more often, but it is remarkable that the caterpillars (about two dozen) were nearly full grown on June 16th, as Harris and Scudder give August and September.

3. *Nematus Erichsoni* on *Larix Europæca.*

A large number of larvæ very young to nearly full grown, some probably full grown, were sent living with the twigs. The larvae agree perfectly with description and figure in Ratzeburg's Forst-Insecten, Tom. iii., pl. 3, f. 4. The species is not represented in the collection here, neither in the larva nor in the imago state. It is not mentioned in Mr. Norton's Catalogue of N. Am. Tenthredinidae. I have to remark that the larvae of the three other species living in Europe on *Larix*, viz., *Lyda laricis*, *Nematus solea* and *compressa*, from their description, do not agree with those sent to me. I am indebted to the Harvard Arboretum and its Director, Mr. Chas. S. Sargent, for these specimens.

THE LARVA OF CATOCALA UNIJUGA.

BY D. S. KELLICOTT, BUFFALO, N. Y.

I obtained, June 16, 1880, from the trunk of a *Populus candicans*, at Buffalo, N. Y., two larvæ which proved to be those of *C. unijuga*. They had passed their last moult when taken; although they continued to feed in confinement for five or six days they increased in size but little during that time; their habits are strictly nocturnal. When first observed they were clinging to the bark beneath a limb, lying obliquely, and so flattened and leech-like that, together with their gray color and lateral fringes blending with the bark, they were difficult objects to discover; but for the fact that the first one seen occurred on a plane with the eye they would have been overlooked entirely. When disturbed they jerk themselves from side to side and move off rapidly with the gait of a semi-looper, although possessing sixteen legs.

The larger one measured 2.2 inches, the smaller 2 inches. The body is attenuated at extremities, especially anteriorly. The general color is gray above, below pink with a sub-elliptical black spot to each segment, those on the thoracic rings not conspicuous. The head flattened, slightly bilobed, lighter in hue than the body and bordered by a well defined black line. The lighter head lobes under a hand lens appear mottled and reticulated with black lines and blotches. The dorsal line is white, made up of patches, illy defined circles and spots alternating; on each ring on either side of the line there are two white papillæ from each of which arises a white hair; above the stigmata there is a white interrupted line, below them a black line also interrupted. The stigmata are rather large, elliptical, whitish surrounded with a black border. There is a row of stout hoary filaments just above the line of the legs. No protuberances appear on the dorsal aspect of any of the rings.

June 22nd the larvæ ceased to feed. On the following day they had fastened together some leaves by means of a silken gauze, brownish in color; by the 26th both had transformed. The larger pupa measured 1.2 in. At first the thorax and abdomen are red, wing covers dusky; after a few hours the whole surface becomes densely pruinose. Under the microscope the surface appears rough like Russia leather. The stout thorax is quite convex above, head smooth, abdomen attenuated, its tip black, bearing eight hooked hairs, the four upper, smaller, turn towards the median line, the four under, larger, turn away from it; by hooking

into the cocoon they retain the pupa more securely. The pupa and the larva also in cocoon before its change, when disturbed, throw themselves from side to side so rapidly as to give a sound like a shaken seed pod.

July 15th, one pupa disclosed a male *unijuga*, rather under size ; the second, smaller one, failed to give an imago.

Notes.—July 11th, when taking dinner at a farm house, I saw a large female of this species fly in at the open door ; it flew about the room until captured. There was a specimen of *P. candicans* growing hard by.

BIBLIOGRAPHY OF ECONOMIC ENTOMOLOGY.

We desire to call the attention of our readers to the following circular lately issued from the Department of the Interior :

DEPARTMENT OF THE INTERIOR.

Office of the U. S. Entomological Commission, }
 Providence, R. I., Jan'y 1st, 1881. }

DEAR SIR,—

The U. S. Entomological Commission designs preparing for publication a bibliography of American (and Canadian) economic entomology. The bibliography will contain references to papers, articles and notes in agricultural and popular scientific periodicals, as well as journals devoted to bee culture, and as complete as possible references will be made to entomological notes in those periodicals which appeared prior to 1850. The titles of notes, articles, reports on works, will be entered under the name of authors, or of periodicals, especially agricultural reports and papers with brief digest of contents given in a line or two, in the same style as in Mr. Mann's excellent bibliographical record of *Psyche*, the organ of the Cambridge Entomological Club, of Cambridge.

After due pains are taken such a record will necessarily be quite imperfect. The compiler will have to rely much on aid from authors of any and every article or note in economic entomology. Its completeness will greatly depend on the care with which entomologists may prepare lists of their own articles. Entomologists are, therefore, earnestly requested to co-operate by sending full lists of their papers on any subject connected with *economic entomology* (not general or scientific entomology unless bearing on the applied science) and prepared in the style of that of *Psyche*, to the undersigned, at Providence, R. I.

Very respectfully,

A. S. PACKARD, JR.

ON A VARIETY OF CATOCALA NEBRASKAE, DODGE.

BY G. M. DODGE, GLENCOE, NEBRASKA.

Catocala Nebraskae Dodge, var. *Sonnus*.

Fore wings, head and thorax black, thinly powdered with gray scales. Abdomen and long scales at base of hind wings clear black. Fringes of wings as in typical specimens. Legs and under side of body dark. All the lines on fore wings indistinct, being merged in the ground color. Two ♂'s. Glencoe, Neb.

Normal *Nebraskae* has fore wings, head and thorax light gray, sprinkled with black scales. Abdomen pale brown. Lines black and very distinct.

A LIST OF THE BUTTERFLIES FOUND AT POTSDAM, N. Y.

- P. asterias*, Drury ; common last of June and July.
turnus, Linn. ; very common May and June.
 Arctic form ; common May and June.
 Orange var., shown in Edward's Plate iv., Pt. vi. ;
 scarce.
oleracea, Harris ; scarce, July.
rapae, Schrank ; generally very common all summer.
 var. nov. *angliae*, Scud. ; rare, but one specimen taken July 19, '77.
Colias philodice, Godart ; very common all summer.
D. archippus, Harris ; generally common, August.
A. aphrodite ; scarce, August.
 myrina ; common, July.
 bellona ; rather common, July.
M. phaeton, Drury ; common a short time in June, very local.
V. antiopa, Linn. ; very common in Oct., worn specimens early in April.
 cardui, Linn. ; generally common June, quite scarce 1878.
 milberti, Godt. ; rather common last of May and during June.
 atalanta, Linn. ; " " "
 J-album ; rare, but one specimen taken.
L. misippus ; common, July.
 arthemis, Drury ; very scarce middle of June.
S. nephele, Kirby ; common last of July, Aug. and first of Sept.
G. c-argenteum, Kirby ; " " " "
L. violacea ; early in May.