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SILVER-TOP IN GRASS AND THE INSECTS WHICH MAY PRODUCE IT.*

BY HERBERT OSBORN, AMES, IOWA.

The common affection of various grasses, commonly known as "Silver-top," has received the attention of such well-known investigators as Professors Comstock, Lintner, Forbes, Fletcher and others, and it is not with the expectation of completely solving the problem which has perplexed these careful students that I venture to present my experience, but in the hope that by comparisons of experience and observation we may arrive at a better knowledge of a subject at once important and complex.

The appearance of affected grass has been often stated and can be described briefly as a whitening of the upper portion of the stalk of grass, especially the head, which withers without maturing seed, while the basal portion is shrivelled. The causes assigned for this whitening have been various, but, I believe, generally referred to the injury produced by some kind of insect operating at the base of the terminal node of the stalk.

The various observations upon the insects suspected of causing the injury, or found associated with it, are admirably summed up by Mr. James Fletcher, Entomologist to the Dominion of Canada, in his report for 1888, pp. 59-62. Briefly, the species credited with the most certainty so far have been species of *Meromyza*, *Chlorops* and *Thrips*, while Mr. Fletcher mentions suspecting species of Hemiptera, and records an attempt to produce Silver-top by caging such Hemiptera (species not designated) upon grass plants.

The species which can perhaps be considered as having been most positively connected with the disease is a *Thrips* called *Limothrips poaphagus* by Prof. Comstock, and while, as will be shown later, I feel certain that but little if any of the trouble which has come under my

*Read before the Society for the Promotion of Agricultural Science, Indianapolis, August, 1890.

own observation can be due to this insect, I wish to state beforehand that I have no thought of discrediting Prof. Comstock's observations, or questioning the ability of the *Thrips* he describes to cause all the injury credited to it. It is evident, upon slight examination of the subject, that the same appearance of the grass may be produced by very different agents, provided they attack the same point in the stem. Any injury to the juicy base of the terminal node that cuts off the flow of the sap to the head during a certain stage of its growth must produce the withering and whitening so conspicuous in affected fields. Starting with this premise it is reasonable to conclude that the trouble *may* result from a number of different agents, and such, I believe, to be actually the case as a result from the sum of my observations here presented.

During the past two seasons I have examined with care a great number of affected stems, usually with the aid of a hand lens. For the season just past my observations in the field were interrupted, shortly after the appearance of Silver-top, by a trip to Washington. But while absent I had a graduate student collect as many of the whitened stalks as he could and place them in alcohol, and these have been examined also so as to make the observations extend through as much of the season as possible. In a very few cases I have seen evidence of fungi present in the shrivelled base of the withered node, but so very few and in such cases so evidently a consequent of the injury that I do not think it can be credited with any of the damage.

In a very small proportion of cases I have found *Thripidae* present in the injured part, and in so few when the greatest care was taken to get stems that were but just beginning to show injury, that I feel forced to abandon the view that these are the principal agents in the injury here. Dipterous larvæ have been still less frequent and I feel positive that only an exceedingly small part of the damage for the region studied can be referred to them. Moreover, I think that in fully ninety per cent. of the stems examined (so many examinations have been made at odd times during my walks, and in spare moments, that no exact percentage can be given,) no insect of any kind was found to be within the sheath of the injured stem.

Punctures of insects have been noticed in great abundance on the parts of the plant around these injured parts, and in many cases evidence of the puncture of the succulent portion itself was apparent. The character of these punctures agreeing closely with those known to be

made by various species of Homoptera affecting the same plants, and the conclusion that these insects are responsible for a part at least of this injury seems to me to be very strongly suggested, though not demonstrated.

There is no question whatever that these Homoptera puncture grass, both blades and stems, to procure their food. This is shown by the numerous punctures and deadened spots on the leaves and stems, and can be verified by watching the insect itself. That the puncture of the stem just above the joint so as to enter the succulent base of the terminal node, and the extraction of the sap from that part, would cause their shrivelling and the consequent withering of the node above, seems sufficiently evident.

Knowing the habits of these insects, and considering the fact of their actual occurrence on the injured plants and the presence of injured spots, such as these insects make in getting their food, there seems to me no reasonable doubt of the *possibility* of these insects causing all the damage observed. The difficulty, in case we accept this view, is to explain why Silver-top is not more abundant than it is, or that such experiments as that by Mr. Fletcher in caging Hemiptera on grass did not produce it, for these insects swarm on almost every blade of grass. These insects, however, work on leaves and stems all the way from the surface of the ground to the tip, and their punctures are distributed promiscuously over all their surfaces. In stiff leaves and sheaths as well as in the stems above the succulent basal portion the shrivelling is confined to the few cells immediately surrounding the puncture, but in case the beak is thrust into the succulent part the effect is to kill the cells of an area through which all the sap for the nourishment of the upper node must pass, and, hence, the more conspicuous effect.

Some of my observations, moreover, show that this injury is not confined entirely to the upper joint, though always most conspicuous in the whitened head, but I have found the stem affected in lower nodes, and in some cases almost to the ground, in which cases also some of the upper leaves show the whitening effect of the injury.

The species of Homoptera most likely to be concerned in this work, are the common species of *Deltocephalus*, especially *inimicus debilis*, etc., which are serious grass pests, in any case, from their attacks upon the stems and leaves, and which I have recorded in some detail in a recent report to the Division of Entomology.

If correct in the opinion that the greater part of this injury where I have observed it is due to these insects, the matter of applications for their destruction becomes much easier, as we then have to deal with insects exposed to destructive liquids, or to destruction with "hopper dozers" and similar contrivances.

My argument in brief is this: "Silver-top" may be produced by a number of different insects—a point already made by Mr. Fletcher. It may result from the action of insects within the sheath, or from puncturing and sucking of sap by insects that operate from the outside. In my own observations but a very small percentage of affected stems have contained insects of any kind within the sheath, and many show clearly evidence of puncture from without.

The species most abundant in the affected fields, and known to puncture grasses, are mainly *Jassidae*. These insects are sufficiently abundant, and their habits entirely in accord with the injuries noted. No other insects of sufficient abundance, and with habits to make it probable that they could cause the injury, have been found in the silver-topped grass.

I conclude, then, from all the observations made so far, that for the locality studied, Homoptera (mainly *Jassidae*) are the principal causes of the disease. The insects are open to general attack, and Silver-top should be prevented by their destruction.

[The attention of Canadian observers is invited to this important subject. The appearance known as "Silver-top" has increased enormously in some districts during the last few years. In many cases examined the cause could not be ascertained.—ED. C. E.]

SOME RARE LEPIDOPTERA TAKEN NEAR MONTREAL.

BY A. F. WINN, MONTREAL.

Thecla laeta, Edw. I was fortunate enough to take a female of this rare and beautiful butterfly on the top of Beloeil Mt., 22 miles east of Montreal, on May 24th, 1888. I again visited the place on the same date in 1889 and 1890, but on both occasions the weather was too cloudy for anything to be on the wing.

Thecla acadica, Edw. I took two specimens at St. Rose, July 7th, 1889, flying over a field of oats, among which there was a quantity of wild mustard in flower, and the butterflies visited the latter occasionally, but only for a moment, and then dashed off.

Thecla strigosa, Harr. Very rare some seasons, and rather common others. Flies in the beginning of July, and frequents the flowers of *Asclepias* and *Apocynum*.

Pamphila leonardus, Harr. One specimen (♀) taken on the flowers of Golden-rod, September 7th, 1890. The first I have taken.

Dilophonota ello, Linn. I have been given a specimen of this "visitor from the south," that was found in the grass on McGill College grounds about the end of September, 1886. This is an interesting capture, as the date agrees exactly with captures in Ontario at London, Hamilton, and Dundas, already recorded in the CANADIAN ENTOMOLOGIST.

Crocota Treatii, Grote. One specimen taken at rest on the trunk of an oak, July 6th, 1889.

Dryocampa rubicunda, Fabr. This is recorded as being very rare in this province (CAN. ENT. VI., 220; VII., 109); but since the introduction of electric lights in our streets a number have been taken every season.

Thyatira pudens, Guen. One specimen found at rest on a lamp post, May 13th, 1889.

Charadra deridens, Guen. I bred a specimen of this moth Feb. 21st, 1889. The larva was found on oak, and agreed exactly with the "unidentified larva" described in Vol. XVIII., p. 124 of the CAN. ENT. Last September I found two larvæ on white birch, but not having enough boxes with me to keep all the species of larvæ separate, I put a *Noto-donta* larva in the same box, and when I reached home I found that both my *deridens* had been bitten to death.

Syneda Alleni, Grote. Two specimens, 1889, one taken at Cote St. Antoine, flying at noon, June 30th; the other in the city, about the middle of July, by light.

Marmopteryx strigularia, Minot. I took this species in large numbers in a maple grove near St. Therese, on August 31st, 1890. They seemed to be confined to this place, as in the fields surrounding the wood none were seen, but as soon as the woods were entered they flew up from the trees by dozens to settle again a few yards off on other maple trunks. When at rest the wings were invariably closed over the back like those of a butterfly, showing the beautiful marbling of the under surface.

SOME INDIANA ACRIDIDÆ.

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

(Continued from page 81, Volume xxiii.)

22. MELANOPLUS FEMUR-RUBRUM, De Geer. The Red-legged Grass-hopper.

Acrydium femur-rubrum, Harris, Ins. Inj., 1862, 174, fig. 80.

Caloptenus femur-rubrum, Thos., Syn. Acrid. N. A., 1873, 163.

Id., Ninth Rep. St. Ent., Ill., 1880, 124,
figs. 22, 23.

Riley, Rep. U. S. Ent. Comm., I., 1877,
50, pl. II.

Melanoplus femur-rubrum, Scudd., Proceed. Bost. Soc. Nat. Hist.,
XIX., 1878, 284.

Our most abundant and injurious species found everywhere during the autumn months, but prefers open blue grass pastures and roadsides. Males and females of this species, as well as of the next, were taken in copulation as late as November 22. When disturbed it either hops vigorously to one side or flies swiftly and noiselessly straight ahead for about twenty feet and then suddenly drops to the ground.

23. MELANOPLUS ATLANIS, Riley. The Lesser Grasshopper.

Caloptenus atlantis, Riley, Rep. U.S. Ent. Comm., I., 1877, 49, pl. II

Id., U. S. Agr. Rep., 1883, 172, pl. II.

Thomas, Ninth Rep. St. Ent., Ill., 1880, 124.

Melanoplus atlantis, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX.,
1878, 285.

This species is fully half as common as *femur-rubrum*, and is found in company with it, the habits of the two being essentially the same. The notched apex of the last abdominal segment of the male of *atlantis* readily distinguishes that sex from the corresponding one of *femur-rubrum*, but the females are very similar and more difficult to separate. However, a little practice will enable one to distinguish them, even in the field, by colour characters alone, the abdominal sternites of *atlantis* being yellow, while those of *femur-rubrum* are dark reddish brown. Moreover, the upper outer surface of the posterior femora of the former are banded with three oblique yellowish bands, those of *femur-rubrum* being plain.

24. MELANOPIUS COLLINUS, Scudder.

Melanoplus collinus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX.,
1878, 284.

Six males of the above species, which Mr. Scudder states has not been heretofore recorded as being found west of New England, were taken on Oct. 25, from shady places along the bed of the old Wabash and Erie Canal. I was not able to distinguish the females from those of *femur-rubrum* and *atlanis*, with which the ones taken were in company. The males are readily distinguished from those of *femur-rubrum*, which Indiana species they most closely resemble, by the following characters: The average size is less; wings shorter, not reaching tip of abdomen; elytra with fewer and smaller spots, and by *having the anal cerci forked at the tip*.

25. MELANOPIUS DIFFERENTIALIS, Thomas. The Lubberly Grasshopper.

Acridium differentialis, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 450.

Caloptenus differentialis, Id., Syn. Acrid. N. A., 1873, 166.

Id., Ninth Rep. St. Ent., Ill., 1880, 127,
fig. 24.

A very common species along fence rows and borders of cultivated fields, especially in the Wabash river bottoms, where they feed upon the greater ragweed, *Ambrosia trifida*. On Oct. 2 hundreds were seen along the edge of a field of lowland corn, the leaves of the marginal rows of which they had almost wholly destroyed. When a stalk was approached, they did not desert it, but dodged quickly around to the opposite side, much as a squirrel does around the trunk of a tree when pursued. If, however, one took alarm and jumped, all the others in the immediate vicinity did likewise. The females of this species become exceedingly dark, sometimes almost black, with age, whereas the males are but little changed.

26. MELANOPIUS BIVITTATUS, Say. The Yellow-striped Grasshopper.

Acridium flavo-vittatum, Harris, Ins. Inj., 1862, 173.

Acridium bivittatum, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 449.

Caloptenus bivittatus, Id., Syn. Acrid. N. A., 1873.

Id., Ninth Rep. St. Ent., Ill., 1880, 126.

Melanoplus femoratus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX.,
1878, 284.

This usually abundant species is rather scarce in Vigo County. It frequents meadows, especially those of clover, and open pastures, and like *C. differentialis*, uses its wings but little in moving from place to place, relying upon its enormous leaps to carry it out of danger.

TETTIGINÆ.

27. TETRIX ORNATA, Say. Red-spotted Grouse Grasshopper.

Tettix ornata, Thos., Syn. Acrid. N. A., 1873, 183.

Tetrix dorsalis, Harr., Ins. Inj., 1862, 186.

Tetrix bilineata, Harr., loc. cit., 186.

Numerous specimens of this genus were taken which varied exceedingly in size and coloration, but which, under the present confused state of the literature at command, are all referred to the above species. They frequent the edges of dry, open woods, where they were quite common during the warm afternoons of October and November.

28. BATRACHIDEA CRISTATA, Harr. The Crested Grouse Grasshopper.

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

Rare. Four or five specimens were found in company with the last named species. It is not mentioned in either of Thomas's Illinois lists, and I can find no record of it west of New England.

29. TETTIGIDEA LATERALIS, Say. Black-sided Grouse Grasshopper.

Tetrix lateralis, Harris, Ins. Inj., 1862, 187.

Tettigidea lateralis, Thomas, Syn. Acrid. N. A., 1873, 187.

Very common and variable in colour; frequenting the same localities as the last two species.

30. TETTIGIDEA POLYMORPHA, Burm. Small-winged Grouse Grasshopper.

Tettigidea polymorpha, Thomas, Syn. Acrid. N. A., 1873, 188.

Tetrix parvipennis, Harris, Ins. Inj., 1862, 187, fig. 82.

As common as the preceding, and found with it.

The Grouse Grasshoppers are the only *Acrididæ* which, with us, hibernate in the perfect state. They have often been taken by the writer in midwinter from beneath logs and the bark of stumps, and on warm days in early spring they are very frequent on hillsides which have a southern slope. Dr. Harris well describes their movements when he says:—"They are extremely agile, and consequently very difficult to capture, for they leap to an astonishing distance, considering their small size, being moreover aided in this motion by their ample wings."

NOTE ON GRAPHIPHORA, HUBN.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

On page 92 of the Bulletin U. S. N. Museum, No. 28, Prof. Smith says: "Mr. Butler says *augur* is the type of *Graphiphora*, Ochs., in which case the application of the name to the *Taeniocampa* series by Mr. Grote would be unwarranted." I never fixed the type of Ochsenheimer's genus *Graphiphora*. What I did was to fix the type of Hübner's genus *Graphiphora* (see Check List, Part II., 1876, p. 37). Hübner proposes the name in the Tentamen for *gothica*, which, as it is the only species given, is therefore the type. Afterwards, in 1816, Ochsenheimer, 4, 68, includes *ravida* and 16 species not separable from *Agrotis*. Hubner's type, *gothica*, Ochsenheimer includes under *Episema*. By what process Mr. Butler assumes *augur* as the "type" of Ochsenheimer's genus is unknown to me. In any event Hübner's genus *Graphiphora* has precedence for *Taeniocampa* of Gueneé.

I may here also correct a misapprehension of Prof. Smith's with regard to the use of *vetusta* by Mr. Walker. On page 212, l. c., Prof. Smith says: "Mr. Grote has suggested that this (*i. e.*, *Agrotis vetusta*, Walk.) may be the same as *murænula*, G. & R., but this can scarcely be so if the description is at all to be relied upon." In reply I would say that I never suggested that *Agrotis vetusta*, Walk., was = *murænula*, but that *Mamestra vetusta*, Walk., might be that species (see Essay, p. 43.) It appears that Walker has two *vetustæ*, consequently Prof. Smith's apprehension that *murænula* may come to be discarded for either of them, proves groundless.

From an examination of Walker's type of *Mamestra insulsa* I came to the conclusion that it was probably an *Agrotis*. Prof. Smith says, Bulletin, p. 209: "Mr. Grote, whose reference of the species to *Agrotis* has been followed, gives no suggestion as to the species it most resembles, or where its allies are to be found." On page 43 of the Essay, where I make the reference, I say: "The specimen (from Canada) is evidently an *Agrotis*, allied to *Repeitis*, and unknown to me."

ON THE OCCURRENCE OF TWO SPECIES OF COLEOPTERA NEW TO MONTREAL.

BY J. F. HAUSEN, MCGILL COLLEGE, MONTREAL.

Platynus crenistriatus, Lec. I took a specimen of this interesting little beetle (fig. 1) here late in October, at the foot of a stump. It is not unlike in appearance certain small *Pterostichi*, but may be at once distinguished by having the elytral margin behind sinuate and simple, without the interruption and route fold usually seen in *Pterostichus*. It seems to me to be, in fact, one of those less specialized forms still exhibiting characters in common with some species of that genus. The form is convex, black and shining, with the elytral furrows deep and strongly punctured, feet and three basal joints of the antennæ bright yellow, the external margins of the elytra and edge of the prothorax

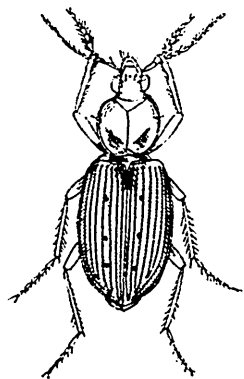


FIG. 1.

beneath piceo testaceous. Whether it is common elsewhere I know not, but it is the first specimen I have yet met with here. It seems of rather wide distribution, as the specimens from which Leconte originally drew up his description (*New Species of Coleoptera*, p. 9, 1863,) were obtained from Illinois.

I took with this an example of another singular *Platynus* not usually found here, and which Dr. Leconte has replaced under the old name under which it was described, namely, *Anchus pusillus*, Lec. Specimens are also in my collection from St. Jérôme, P. Q., and Northern Vermont.

Some time since I was handed, for identification, by one of the members, a little

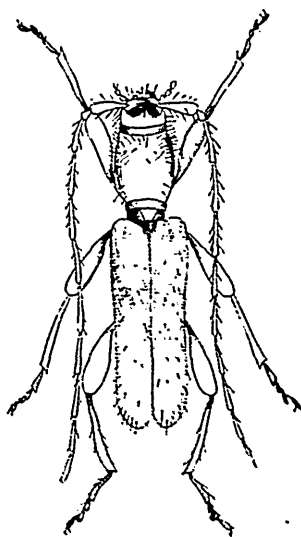
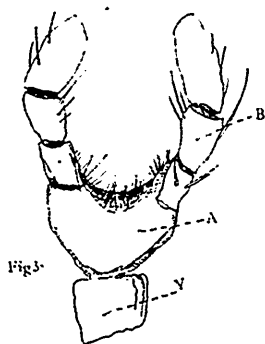


FIG. 2.

longicorn I did not at first know, but which on closer examination proves to be a specimen of *Gracilia minuta*, Fab. (Fig. 2.) My friend, Mr. Caulfield, who has very kindly placed all his specimens in my hands, states it was taken emerging from a barrel of some kind of dye, and it is probably introduced from Southern Europe. Superficially it resembles somewhat one of the *clytini* and, in fact, Schiödt placed it immediately after *clytus*. (Class. Cramb. Dan. Faun., Natur. Hist. Tidsskrift, 1864, S. 3. V. 2, p. 483.) But the slightly depressed elytra, corneous ligula, not finely granulate eyes, etc., would point to its being perhaps more properly placed in *Æme* of *cerambicini*. For the benefit of those who may not know it, and especially as it does not appear, so far as I am aware, to have been before recorded from Canada, it may be well briefly to describe it.

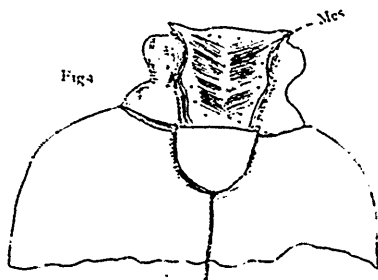


Fab. = *pygmaea*, Fab. = *fusca*, Hald.

Fig. 3 represents the labium (A) the ligula and paraglossæ being in this case confused and indistinct; B lateral palpi; Y basal membrane of labium.

Fig. 4 shows the mesonotum which is large, glabrous, margined at sides and covered with stridulating surface consisting of extremely fine transverse lines.

The figure (2) it is hoped will convey some idea of its general form. It is of a uniform reddish brown, the legs being somewhat lighter, with rather sparse cinereous pubescence giving it a hoary appearance. The antennæ are ciliate and the head, thorax and elytra furnished with flying hairs. Rather variable in size, 18-27 in. Leconte states (Jour. Acad. Nat. Sc. Phila., 1850, pt. 1, p. 24) he could find no difference between his specimen and those from Europe. As somebody may have it under a different name, I will give the synonyms: *G. minuta*,



LIMENITIS ARTHEMIS, ETC.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The paper by Mr. W. H. Edwards in the March number of the CANADIAN ENTOMOLOGIST brought back to me vividly my collecting days in the Catskills, and as I have also taken *arthemis*, *proserpina* and *ursula*, perhaps my experiences may not be entirely uninteresting. It was sixteen years ago that I set out for a two weeks' tramp in the mountains, and as it was my first experience with them, the memory of that trip is yet more distinct than of many subsequent excursions. I arrived at Catskill village soon after sunrise, and before noon was close to the foot of the mountain. I saw more butterflies there than I had ever seen at any one time before, and gathered in a large harvest, of *Argynnis* more especially. *Limenitis ursula* was abundant, but as this was already an old acquaintance, I captured only such as offered themselves too temptingly. My objective point for that day was the Mountain House on the summit, and soon after I started the climb I noticed that *ursula* became smaller, and had an odd look somehow. I took a few, and above the Rip Van Winkle House began to take *arthemis*, and saw no more *ursula*. I stopped at the Rip Van Winkle, deeming it a good collecting centre, and stayed there a week. On the second day a colony of ants invaded my room, and before I discovered them, destroyed a large part of my first day's collecting. I threw away all the *ursula*, but saved some of the odd-looking specimens which had suffered little, and these proved *proserpina*. I took *arthemis* on the top of the mountain, but no more *proserpina*. Had I known the insect, I could no doubt have captured many, lower down the road, but I never tramped that way. In five different, not consecutive years thereafter, I visited the Catskills, but made Lexington, only a few miles—six, I believe—west of Hunter, my stopping place. This is about 2,000 feet above sea level, though lower than Hunter. To reach it from the U. & D. R. R. meant a 13 mile drive from Shandaken through the "notch," which is nearly a duplicate of Stony Clove. In this "notch," which I often visited, I took many a good insect, and it was a reliable locality for *arthemis*. They were very abundant always, though rather shy; but I never found *proserpina* during the five years I collected there. But on the other hand I took *ursula* on both sides of the pass, both at Shandaken and at Westkill, and along the banks of the Schoharie at Lexington. There is no doubt, therefore, that

ursula gets within a very few miles of Hunter, and that to reach Stony Clove it would not be necessary for it to come from the Hudson Valley. There are no natural obstacles to prevent a direct flight over the Schoharie to Hunter. Through Stony Clove I have been only once, and that by rail on my last visit to the mountains, when I did no collecting.

As to the standing of *proserpina* I have no opinion to offer.

Mr. Edwards, on p. 55 in the note, makes some remarks on the value of genitalia in determining species. On this point I have very decided opinions. By his suggestion that "some seem to have shrunk in the drying, others perhaps are done from the green subjects, and are full and plump," Mr. Edwards shows that he has never looked into the matter himself at all, else he would know that the structures are chitinous and cannot shrink any more than the antennæ, palpi or legs. The preparation from the recent specimen, and that from one fifty years old, would be alike in the same species. Do the parts vary? Decidedly no, or to so slight an extent as to be scarcely appreciable. I have examined dozens of specimens of some of our common noctuids, and found no variation, however much the maculation differed. In my study of the *Lachnosterna* many hundreds were examined, some specimens a dozen years old, others just killed, and the correspondence was absolute. Do they help us distinguish species? Also, decidedly yes. But this needs qualification. Identity of sexual structure does not necessarily mean identity of species; but on the other hand, difference in sexual structure *always* means difference of species. I have found these structures of the utmost value in the *noctuidæ*, and in some genera that I have studied would not hesitate to determine species from the genitalia alone. In *Lachnosterna* I would agree to name any species of either sex from the genital structures where it is one of the species I have figured.

But Mr. Edwards is right in one respect. Sometimes the character fails, and in an entire genus all the species will be practically alike. My revision of *Agrotis* illustrates that most strikingly. In this, however, the character shares with many another the burden of want of universal application, and we must use it as far as it goes. In the noctuids it is most valuable in separating closely allied species, and it often determines for me the rank of a form when the other characters leave me in doubt. I believe that all who have carefully studied these characters are convinced of their importance and high value in specific separation.

NOTES ON THE LIFE HISTORY OF *ECPANTHERIA*
SCRIBONIA, STOLL.

BY HARRISON G. DYAR.

The preparatory stages of this species do not seem to have been described. Mr. Hy. Edwards in his catalogue gives eleven references, but in none is the egg mentioned, or any but a single larval stage, and in only one the pupa. It will, therefore, not be amiss to briefly describe the several stages here. I would like first to call attention to the remarkable fertility of the insect in question, at least in Southern Florida where I met with it. In *Psyche*, Vol. III., p. 364, Mr. Krancher cites an example of an European moth *Lasiocampa quercifolia*, that laid 580 eggs, and seems to consider this an unusual number, as it doubtless is; but my example of *Ecpantheria scribonia* laid nearly four times as many.

The moth was bred from a larva found at Palm Beach on Lake Worth, Florida, and emerged from pupa Feb. 4, 1890. As it was a female and crippled, the wings having failed to develop properly, I tied it out over night and the next morning found it mated with a male of the variety *denudata*, Slosson. On the evening of Feb. 6 it began to deposit eggs on the sides of the box in which it was confined, and during the night laid about 400 eggs. Every night after this it laid eggs till the night 10-11 February, after which it died. The total number was 2,274 as nearly as I could count them.

Egg: Nearly spherical, the base a little flattened, all minutely punctured; colour yellowish pearly gray; diameter .8 mm. Duration of this stage about five days.

First stage: Head light brown, paler in front; ocelli large, black; width .5 mm. Body pale whitish, except the first and central abdominal segments (joints 5, 6, 9, 10 and 11) which are light brown. The warts are arranged as usual in the *Arctiidae*,* concolorous, the bristles black. Length about .2 mm. Duration of the stage four days.

Second stage: Head nearly colourless, shining, tinged with brown; ocelli large, black; mouth parts brown; width .7 mm. Body nearly concolorous with the head, not shining, tinged with reddish brown. The warts of rows (1) and (2) (the trapezoidal warts) on joints 5, 6 and 9-11

*As in *Arctia*, *Leucarctia*, *Spilosoma*, *Hyphantria*, *Arachnis*, etc, but not as in *Halisidota*.

black; hair black. Later the body becomes more brownish, blackish around the black warts and a pale dorsal line is seen. This stage lasted four days.

Third stage: Head semi-transparent, pale brownish; a darker shade at the vertex; maxillæ reddish; ocelli black; width .9 mm.; cervical shield and legs black; body light reddish brown except the dorsal warts on joint 4, joints 5 and 6 entirely, and joints 8, 9, 10 and 11 in the subdorsal space, which are black; a white dorsal line; bristles spiny and sharp, black. Duration of the stage six days.

Fourth stage: Head shining pale brownish; the mouth parts paler; ocelli black; width 1.4 mm. Body reddish orange with a slightly paler dorsal line; joints 5, 6 and 9-11 are black, the latter in the subdorsal space only, and most of the warts are black. The length of the larva is about 10 mm. Duration of the stage six days.

Fifth stage: The markings of the mature larva are now assumed. Head brown, blackish in front; ocelli and inside part of the jaws black; labrum and antennæ pinkish; width 2 mm. The body is marked as in the mature larva, black with transverse vermilion bands, except that there is a faint pale dorsal line anteriorly.

Sixth stage: As in the preceding stage. The width of the head is 2.8 mm. and the dorsal line is reduced to a mere trace. Feet reddish and spiracles ochre.

Seventh stage: Head irregularly black in front, brownish at the sides and vertex; mouth parts and antennæ reddish; width 4 mm. Body as in the mature larva, except that the transverse bands are lighter red. Length of larva 45-60 mm. Duration of the stage nine days.

Eighth stage: Head brownish black with a pale line in the suture at vertex and a pale spot on the side posteriorly; labrum and antennæ salmon colour; jaws brown; width 5.3 mm. Cervical shield straight in front, curved behind, bisected by a pale line; body velvety black except a transverse vermilion band on each segment in the intersegmental incisures on joints 5-11 inclusive, concealed when the body is contracted. Thoracic feet brownish red, abdominal feet brown, the lower part salmon colour and the claspers whitish; spiracles dark orange; bristles spiny and sharp, black. Length of larva 85-95 mm. at maturity. Duration of this, the last stage, eleven days.

Cocoon: A thin netting of yellowish silk just as in *Arachnis picta*. The drops at the joinings of the threads are yellow like little amber beads.

Pupa: Robust, of normal shape; on the abdominal segments, dorsally and subventrally are ten rows of large tufts of short spiny hairs, the tufts smaller ventrally and less numerous posteriorly; cremaster, two tufts of reddish spines from elevated bases. Colour black, reddish in the abdominal incisures; the body is smooth and dull, the wing cases more shiny, creased. Spiracles linear, reddish. Length 35 mm., width 13 mm. Duration of this stage twenty-eight days.

Food plants: The larvæ run about on the ground or ascend shrubs or small trees and eat whatever comes in their way, if it is not too coarse. My specimens were fed principally on a species of Spurge (*Euphorbia cyathophora*) and Castor-Bean (*Ricinus communis*).

ENTOMOLOGICAL SOCIETY OF ONTARIO.

THE GEOLOGICAL SECTION of the Society was formed in May of last year, and at the Annual Meeting in August was regularly constituted a branch of the Society. The members are as follows:—Dr. S. Woolverton, President; Thos. Green, Vice-President; J. L. Goodburne, Secretary; and Messrs. B. Green, W. J. Carson, Alex. Marshall, W. Percival, Geo. Burrell and M. Scarrow. The course of study taken up was Sir Charles Lyell's work, which proved of much interest and benefit. Discussion sometimes waxed exceedingly warm, exception being taken to many of the positions erected by various writers; this, however, had a good result, as the discussions caused the subject-matter to be well understood by all. Specimens obtained in the district about London were exhibited at the meeting, and much patient research was sometimes necessary in order to identify examples of obscure fossils, not, however, without a few mistakes, which in the main were subsequently set right.

The members had regular excursions, Friday and Saturday of each week being generally devoted to this—probably the most interesting part of geological study, and not a week passed without some new specimens being placed upon the tables of the entomological rooms. The district around London was well worked up, especially in the vicinity of Springbank. In addition to this trips were made to St. Marys and Arkona, many specimens being brought home from both places.

Taken altogether the year's work has been very satisfactory to the members and interest has not flagged at any time, each member seeming anxious to do what he could towards adding to the interest.

MEETING OF THE LONDON ORNITHOLOGICAL SECTION.—The March meeting of this section was held on the evening of March 2nd, in the rooms of the Entomological Society. After routine business, the monthly list of species observed was taken up resulting in the addition of the following ten species for February, with a total of seventeen species observed during the month:—Goldfinch, Robin, Bufflehead, Great Horned Owl, Great Northern Shrike, Song Sparrow, Bluebird, Junco, White-winged Crossbill, Mottled Owl. The chairman reported that a specimen of the Great Carolina Wren had been received by one of our members, Mr. L. H. Smith, from Forest. This is the first record of its occurrence in Canada. Mr. Stevenson remarked on the abundance of the Snowy Owl in this vicinity during the present winter, about eight or ten having been heard of by members of this section, all seen or taken in the county of Middlesex. The chairman reported the capture of a Bohemian Waxwing in September, 1890, by Mr. Harry Gould, while feeding in a wild cherry tree in company with some Cedarbirds. This appears to be the first record of its occurrence since about 1878, when Mr. W. Hines captured a few in the city in midwinter.

CORRESPONDENCE.

HALISIDOTA TRIGONA.

Dear Sir,—In reply to Mr. Dyar's note on p. 43, I would say that I compared my type with Herrich-Schaeffer's figure of *specularis* from Brazil, and arrived at the conclusion that the two closely allied forms were distinct species. In one of my papers (Tr. Kans. Ac. Sci., p. 65,) I gave the differences observed: "Closely resembles the Brazilian *specularis*, H.-S., fig. 59. It differs by the smaller size of the vitreous spot, the outer edge of which is farther from the external margin and more even. The Brazilian species wants the yellow terminal shade line (from the figure). There is a great resemblance between the two widely geographically separated forms." Mr. Dyar says: "I have compared Mr. Grote's description with H.-S. figure, and there is no doubt but that the two refer to the same insect." The "doubt" I have grounded as

above cited, and, without further evidence than appears, Mr. Dýar's synonymical note is not justified. It is at least previous to the necessary comparison of Brazilian and North American material. Probably our species is distinct, as there are other cases of allied but distinct North American and Brazilian moths, such as *Hepialus auratus* and our common *Orthodes* recently separated by Mr. Butler from the Brazilian *infirmata*.

A. R. GROTE.

NOTES.

ATTRACTING BUTTERFLIES IN COLORADO.

I had generally considered *Papilio indra* to be a rare insect in Colorado, and from the inquiries of correspondents would think it wanting in many collections. While collecting at about 7,000 feet elevation, in June, '89, I occasionally saw one go past me like a flash up the mountain sides; but one sultry afternoon I took several examples in a narrow canon as they sat upon a small piece of sandy ground that had been soaked by a thunder storm in the morning. I acted on the hint thus given, and kept the place well moistened with water from the creek near by, and visited it frequently during the week I was in the vicinity, with the following result:—

Papilio indra, 65 examples.

P. zolicaon, 1.

P. eurymedon, 3.

P. daunus, 10.

Anthocharis olympia, 5.

Argynnis edwardsii, 2.

A. halcyone, 5.

Chionobas uhleri, 4.

Lemonias nais, common.

Nisoniades tatius, 3,

and several common species in abundance. The "Section Boss" of the railroad used to go past frequently, and he got quite interested with my pursuit. I remarked to him one day, I thought it odd I did not attract butterflies on the other places I watered. He said: "Well, it does seem kind o' queer, and I buried a mule in that very spot last fall."

DAVID BRUCE, Brockport, N. Y.

· SOME OBSERVATIONS ON THE COLLECTING OF 1890.

A combination of causes prevented me from doing my usual amount of hunting around Hamilton last summer, and the reports of the collectors there left with me the impression that I was not losing much. I took many a stroll through the city, looking for, and expecting to find something, but invariably returned disappointed.

I suspect that electric lights and sparrows are working a revolution in city collecting. I was informed by a collector, whose duty takes him out early in the morning, that unless he got to a light that was in close proximity to his work before the sparrows, he got nothing; that they know the location of all the lights as exactly as the City Engineer, and when they have cleaned up one, they make straight for another; and they are not content to take merely what is on the ground, but will flutter up and down the pole, and pick off what is at rest on it; or perched on top of a fence, they will survey carefully all below them, and the instant they see an insect, they drop to a level with it, pick it off, and mount the fence again to devour it.

The communications from other parts of the country, which I have received since the season closed, indicate a general disappointment with the result of the collectors' labours.

On the 7th of June I went on a visit to the country, about sixteen miles south of the city, staying to the 23rd. The weather was warm—the first steady heat of the season. There was a bit of open woods close at hand, to which I was a constant visitor, and found hunting there specially interesting and profitable, a goodly number of different Lepidoptera almost daily emerging.

Edema albifrons was in surprising numbers. Look in any direction, and the eye would light on several of them sitting in their own peculiar attitude when at rest, the wings rolled tightly round the body, the front legs straightened out beneath them, supporting the forward part of the insect at an angle to the object it rests on, the lime-grey colour of its wings, and the light coloured, brown margined, singularly truncated head end, giving it an exact resemblance to a bit of rotten twig sticking out from the side of a tree.

Another plentiful thing was *Heterocampa guttivitta*; what most drew my attention to this insect at this time, was the large proportion of deformed ones. We are often disappointed in rearing insects in confinement, by having some of them deformed, and are apt to attribute the deformity

to the confinement ; but this species in nature gave a larger proportion of deformed specimens than I ever got from all my rearing in confinement. *Lunas* were very abundant. I took one dozen, and could have taken three. I found several of them in a badly crippled condition, one particularly so ; on one side the wings were perfect, on the other they had not expanded one iota, they did not even look as large as they should have been when it burst the chrysalis.

I saw *Lunas* flying for the first time in my life. They mount easily and make good progress, but the operation is performed wholly by the front wings ; the tails were crossed, and in one instance I felt certain the curves were linked into each other, giving firmness and immobility to the hind wings. I took a pair of *Packardia geminata* in coitu ; the singular form of the object arrested my attention, without suspecting it was produced by insects. The sexes differ greatly, in both size and markings. It has been an extremely rare insect in my experience, having never seen the male before, so I was much pleased with my find.

I took my first specimen of *Datana angusii*, and a single specimen of a *Datana* of the *ministra* type, but with only three lines across the wings, wavy and comparatively even.

I also made my first capture of *Halisidota maculata*, although *Caryæ* and *Tessellata* are amongst the most constant and plentiful species in the Hamilton neighborhood. On the field day of our Society during its annual meeting in August last, I took a *Tussock* larva on bass wood that attracted my attention by its bright lemon yellow colour, and square black spots down the centre of its back. Not knowing it I showed it to Mr. Fletcher, and he pronounced it to be *H. maculata*. During September they were quite abundant on the maple shade trees about London.

During that June visit I took an *Azelina hubnerata*, which has been in my experience a very rare and variable geometer. I am aware that some of the forms that I have taken may have distinguishing names, but I have not had them authoritatively determined. I also took five specimens of *Dryocampa rubicunda*, my first captures of that attractive moth, several *Tortrixes* and other small moths new to me, which have not yet been identified, and a variety of good but not uncommon moths besides ; also two males and six females of that delicate long-sting Hymenopter *Arotés amœnus*, Cress., making altogether a very satisfactory two weeks' collecting.

I made another visit between the 18th of July and the 2nd of August, to a locality 25 miles north of the city, but got nothing worthy of notice, except, perhaps, a *Catocala relictæ*, for its being somewhat early in the season. In London during November *Operophtera boreata* was very plentiful, yet I did not see a single specimen of an *Anisopteryx*.

J. ALSTON MOFFAT.

VANESSA CALIFORNICA IN VANCOUVER ISLAND.

Noticing the remarks of Mr. W. G. Wright in the February number of the CANADIAN ENTOMOLOGIST respecting *V. Californica*, I considered it would be of interest to give particulars of its capture at Victoria, B. C. During 1890 it was scarce in this vicinity, though probably common enough on higher elevations. The specimens taken by me were captured at Beacon Hill, amongst or near the fir trees that compose the wooded part of the Park, and situate some sixty feet above the sea level. I secured my first as it was rapidly flying along a new made road, which runs through the firs; this was on September 9th. The next time I saw it was September 21st, when I managed after a long run to net a worn-out specimen. A whole month intervened before seeing it again, the third one being captured October 26th. This was the last, and was taken off a fir tree whilst sucking the sap, apparently too satiated with the juice to heed danger, being easily taken, and transferred to my collecting box. It was a good specimen as regards plumage, but ragged and torn, having evidently been "on the road" a long time. Mr. James Fletcher, of Ottawa, kindly named it for me, at same time mentioning that it was the first recorded capture from Vancouver Island, if not in Canada.

I doubt very much if those taken by me were bred here, but hold more to the idea that they were visitors from foreign parts across the Sound, or perhaps from the northern part of the island. Mr. W. G. Wright says:—"It is of no value itself; it is usually present when you don't want it, and its appearance seems to be the signal for more interesting species to disappear." This without doubt is true as regards California, its natural home; but considering all things, I certainly believe that its appearance on Vancouver Island is of value, even if it does nothing more than add another species to the list of diurnals occurring here, and I fondly hope to see it again this year.

W. H. DANBY.

Victoria, B. C., Feb. 21st, 1891.

CANADIAN RHYNCOPHORA.

Since writing the notes on Rhyncophora which appeared in the February issue, I have had an opportunity of obtaining Dr. Sharp's determination of the two species mentioned on pages 22 and 23. He writes to me as follows:—"The two weevils from Cape Breton are: 1. *Otiorrhynchus rugifrons*, Gyll., 2. *Sciaphilus muricatus*, both common N. European insects. The *Otiorrhynchus* is a slight var.; the *Sciaphilus* not distinguishable from Scottish specimens." W. H. HARRINGTON.

ARCTIA ARIZONENSIS, STRETCH.

I obtained eggs from a worn ♀ taken at light near Salt Lake City, Utah, in June; these gave me a fine lot of imagines early in September, and I again got eggs from them, and had larvæ feeding which produced a number of moths at various times during the winter. Some of the larvæ ceased to feed when one-third grown, and I dumped them out among weeds by my orchard fence to take their chances. From the two broods I got about 150 fine examples of the perfect insect. Part of the first lot were fed up by a friend in Ogden, Utah, and sent to me as pupæ, part were fed in Denver City, and many I reared in the mountains above Platte Canon (10,000 feet elevation). The last brood were reared in Western New York. The larvæ were very easy to manage and ate freely of almost anything. Plum, willow, plantain, polygonum, lettuce and chickweed were given them as best and easiest obtainable, but nothing seemed to come amiss. Under the different conditions of altitude, climate and food I ought to have obtained varieties, if the species varies at all, but I never bred any *Arctians* that kept so constant to the parent form. I also have about a dozen of both sexes taken at light in Utah and Central Colorado, and these also are the counterparts of my bred examples. All the males are precisely like Stretch's figure of *Arizonensis* ♂, the ♀♀ exactly like his *Autholea* ♀, in the same work (*Zyg. and Bomb.*), but not one male was like his *Autholea* ♂ as there figured, but all well spotted on underwings like his figure of *Arizonensis* ♂. I give description of the mature larva (the earlier stages were plain black):—Head and thoracic feet shining black with tinges of chestnut; body velvety black with narrow reddish brown dorsal line (produced by two linear spots on each segment). all tubercles intensely black, those above lateral fold all crowned with bunches of short black hairs; those on second and

third segments have many light brown hairs intermixed; the bunches below lateral fold are light brown, thus giving the larva the appearance of being fringed; body beneath and abdominal legs light purplish brown. Length, two inches. Pupa black, covered with white powdery bloom. The eggs were very numerous and small and light yellow in colour. The hairs of the larva possess stinging properties, and are very irritating to the bare arms and face, as I experienced to my great annoyance on several occasions.

DAVID BRUCE, Brockport, N. Y.

PLATYNUS NEW TO CANADA.

Among the commoner beetles at Sydney, Cape Breton, if not indeed the most abundant, is a species which has, I think, not been recorded in Canadian lists. I refer to *Platynus hardyi* which was described by Leconte (Bull. Brooklyn Ent. Soc. Vol. II., p. 53) from Newfoundland specimens received by him from Baron de Chaudoir. I cannot find any record of it from other localities. The specimens which I collected in 1884 were not carefully examined and were placed with *P. cupripennis*, of which a few examples were collected at the same time. On looking over the lot last winter I found that they were undoubtedly *P. hardyi*, and last September I captured a nice series. The species is eminently gregarious, and when a good locality is found they may be seen in numbers under boards or loose stones, but the colonies scatter so rapidly that the majority escape. Whether this beetle is distributed through, and indigenous to the island, or has been brought over from Newfoundland in one of the numerous steamers that carry coal from Sydney and return in ballast, I cannot say.

W. H. HARRINGTON.

BOOK NOTICE.

MANUAL OF ANIMALS INJURIOUS AND BENEFICIAL TO AGRICULTURE.

Dr. J. Ritzema Bos, lecturer at the Agricultural College of Wageningen, Holland, has just published a magnificent volume in German which makes one wish English-speaking farmers and gardeners, as well as entomologists, possessed in their own language, and for their respective countries, a similar compendium of knowledge on the "Animals injurious and beneficial to agriculture, cattle breeding, forestry and horticulture." (*Tierische Schädlinge und Nützlinge*, Berlin, 1891.)

This work of 876 pages contains all the information necessary concerning the forms, occurrences, life history in relation with man of his various animal friends and foes, and the curative and preventative measures against their attacks. The newest discoveries of workers in this field, and original researches by the author are recorded, and 477 figures, engraved with scientific accuracy, show the appearance of the different mammals, birds, insects, snails, and worms, the details of their structure, and many devices for resisting the injurious kinds or assisting those that war against the latter and are thus precious allies of the farmer and gardener.

The first 30 pages are devoted to considerations on the causes of occurrence of obnoxious animals, and on the general means of protection against them. Then 80 pages treat of mammals from the bear to the mouse and the bat, 120 of birds, 460 of insects, 130 of snails and worms. The depredations of insects, which have been particularly studied by Dr. Bos, are especially dwelt upon.

At the end of the book are tables of the animal pests arranged according to the place where they live. This table is most useful, for, with its aid, anyone who has found any form of animal life preying on man, cattle, domestic animal, tree, or plant, or in granary, barn, or house, and wishes to know its name, habits, the nature of its ravages, the remedies against it, etc., can with very little trouble find the page in the volume where the desired information is given.

For instance, the first item of this table is as follows, with reference for each animal to the page in the book:—

BEE, BEE HIVE:—Foxes, marten, polecat, bear, honey-buzzard, tits, occasionally other bird species;—spiders;—wasps;—the brown bee louse (*Braula caca*, a winged louse);—the so-called black bee louse (larva of an oil beetle), which, however, leads usually its cuckoo life only in wild bees' nests;—bee moths, wax moths;—bee-beetles;—earwigs.

Similar lists follow for cat, cattle, dog, domestic birds and eggs, goat, horse, man, pig, rabbit, sheep.

The references to apple tree pests are arranged under the different heads: In roots, in wood, under bark, in bark crevices, on and in buds, on young shoots, on one year's twigs, on buds and leaves, in the fruit, ravagers of the fruit; and similarly for all common trees and plants of field, garden, or forest.

J. A. GUIGNARD, Ottawa.