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The Canadian Entomologist.

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

(Continued from page 199.)

The Club met again at 5 o'clock, August 20th. Mr. J. Fletcher presented some notes upon injuries caused by the Hessian Fly, the Wheat-stem Maggot and an undetermined species of Oscinis. He said that the note was presented with the object of eliciting further information upon a subject which had proved of great interest to him. During the past season he had endeavored to determine the number of broods of the Hessian Fly for the Ottawa district, and had found, first, that the Hessian Fly, the Wheat-stem Maggot and Oscinis were all found at the same time and in the same plant, and further, that, speaking generally, they passed through their stages contemporaneously. Of the three the last had proved much the most destructive. From root shoots of wheat sown on the 14th of April he had bred Hessian Fly and Oscinis at the end of June, and a month later Meromyza had appeared. He had also noticed in some fields at Ottawa that a large quantity of spring wheat was attacked by Hessian Fly in the ground shoots, or stools, in the same manner as fall wheat is attacked in the autumn. It was frequently the case that on plants which had made from fifteen to twenty stools but one would be left, all the others having been destroyed by the insects. He had procured adult Hessian Flies at Ottawa during this season in the beginning of May, at the end of June, and in August, and they would probably appear again in September. He had not been able to find the Hessian Fly breeding in any of the grasses, and would like to know if others had done so. Meromyza and the Oscinis had been most troublesome pests in the experimental grass patches at Ottawa, some grasses being almost exterminated by them. It was remarkable that the spring appearance of Meromyza had been so enormous as to have caused fear of a serious destruction of the wheat crop. As a matter of fact, however, there had been less injury, both to small grains and grasses, than for many years previously. This diminution he could only explain by the supposition that the eggs had been destroyed by some predaceous insect. The eggs must have been laid in large numbers, but there was very little evidence of the presence of the larvæ, either in the standing wheat or barley, or in the root-shoots of barley. The Oscinis he had been unable to identify; but, through the kindness of Mr. John Marten, of Illinois, he had learnt of some work which had been done by Prof. Garman in Kentucky, upon what was probably the same species. This, Mr. Marten said, had been doubtfully identified by Dr. Williston as *O. variabilis*.

Prof. Garman stated that he had studied what appeared to be the same species, and had prepared an article for publication. He also gave some notes upon the life history and anatomy of the insect.

Prof. Osborn had taken at Ames, Iowa, numerous specimens of Oscinis, one of which closely resembled that exhibited by Mr. Fletcher.

Prof. Alwood had studied in Ohio an Oscinis infesting oats, and had published his results in Bulletin 13, Division of Entomology. He had found the eggs, from two to eleven in number, were forced beneath the sheath of the leaf, and that just prior to pupation the larva gnawed through the epidermis and the pupa protruded so as to admit of the easy escape of the adult.

Mr. Fletcher, referring again to Meromyza, stated that in many instances he had found the egg deposited in the field upon the upper surface of the leaf some distance from the stem, and asked if others had observed this to be the case elsewhere.

Prof. Garman had found that the eggs were laid just above the sheath, or sometimes pushed beneath it.

Prof. Webster stated that the eggs of the Hessian Fly had, in the spring of the present year, throughout Southern and Central Indiana, been deposited near the roots, the "flax-seeds" being found in that portion of the plant; while in the northern part of the State the case had evidently been different, as the "flax-seeds" were there almost invariably located about the second joint.

The Secretary read a paper by Mr. Edward L. Graef, of New York, upon the American Silk Worm Moths or Spinners, in which a serious attack upon the shade trees of New York by *P. cecropia* was recorded, and the suggestion made that this and other species might be turned to account, if any means could be devised for manufacturing and utilizing their silk. As a stimulus to this industry, Mr. Graef generously offered a prize of fifty dollars for the best essay and model of apparatus for carrying this suggestion into effect.

Thursday, August 21st.—The Club met at 8 a. m. Dr. C. M. Weed read an interesting paper upon the clover-stem borer, *Languria mozardi*. Fifteen species of plants were reported upon which the larva had been found feeding. This paper was discussed by Profs. Cook, Alwood, Osborn and others.

Prof. Alwood spoke of tobacco insects, of which he was making a special study. He had observed a stem borer which was very injurious.

Dr. Weed had learned of a tobacco root-louse in Southern Ohio.

Prof. Garman spoke of the mouth parts of several species of some families of Thysanoptera, and stated that some recent studies had shown him that the figures published did not agree with his material. He then read the following paper:—

AN ASYMMETRY OF THE HEAD AND MOUTH PARTS OF THYSANOPTERA.

In a brief paper in the Bulletin of the Essex Institute I have recently called attention to peculiarities in the structure of the head and mouth parts which set this group quite apart from other orders of Hexapoda. [This has no reference to affinities upon which, I believe, we are not prepared to pronounce until this and several other groups have been more completely studied.] In that paper it was claimed that the endocranium of the species examined was not symmetrical, being deficient on the right side; that the labrum was one-sided; that there was a developed mandible on the left side, with, at most, a rudiment on the right; and that the mandibles of authors were probably lobes of the maxillæ.

At the time the paper was written I had not examined sufficient material to enable me to say whether the features pointed out were limited to certain species or were common to all members of the group. Since then many additional forms have been examined, all, however, belonging to the families Stenopteridæ and Coleoptratidæ, and in no case has there been found a departure in essentials from the structure of the head and mouth parts as they were described in the paper referred to. It is probably safe to assume, threfore, that the asymmetry noted is characteristic of these two families at least.

Of the group Tubulifera no representatives have been studied. I shall not be surprised, since this is the lowest of the suborders, if examples of Phlæothrips are found to be more nearly symmetrical.

As an interesting fact, though in no way related to the main purpose of this communication, I may mention that the solitary mandible of Limothrips and Melanothrips is perforate, like the jaws of larval Chrysopa, of Dytiscidæ, and of Myrmeleon. In specimens of Coleoptratidæ examined, both labial and maxillary palpi are composed of three segments.

Note.—Since my return to Lexington from the meeting of the American Association I have secured a couple of very young Phlæothrips. My examination of these is not completed, but I have succeeded in demonstrating the single jaw on the left side. The parts are greatly elongated, and remind one of the same organs in Hemiptera. The styliform parts are especially long, extending, when retracted, into the cranial cavity towards the eye, thence bending posteriorly and extending along the posterior wall of the head to the mouth-opening. Both mandible and styliform parts are perforate (or possibly grooved).

Two unmistakable tarsal claws are present in this genus. From their relation of position to the pads the latter would seem to be modified pulvilli.

Prof. Osborn was much pleased with what Prof. Garman had stated. He had also observed some of the points mentioned in a special study which he had made of these insects, and hoped Prof. Garman would publish his results as soon as possible.

Dr. Weed presented a short paper on the oviposition of *Listronotus latiusculus.* The eggs are laid in clusters of from five to ten upon the leaf stalks of *Sagittaria variabilis*, and are covered with small pieces of the epidermis which are nibbled off by the adult beetle. This was discussed by Messrs. Garman, Fletcher and Webster.

Mr. Charles Robertson, of Carlinville, Ill., read a most interesting note upon the habits of the bee *Emphor bombiliformis*, which was originally described by Cresson as a *Melissodes*, but Paton, in revising the genus, raised it to *Emphor*. This bee, it was stated, confines itself almost exclusively to *Hibiscus*, chiefly *H. lasiocarpus*. The appearance and habits of the bee were described. It was stated that in collecting these bees it is important to catch those flying around the plant without alighting, as these were generally the males, whilst those visiting the flowers for honey and pollen were the females. On August 5th, when walking along a dam with water on one side, he had noticed a female standing upon the water; she then flew to a bank, and he observed that she was carrying water to facilitate the excavation of hard ground, into which she was burrowing to build her nest. Sometimes one pellet of earth would be taken out after such an application of water, but at others three or even four. An interesting discussion followed which was participated in by Messrs. Osborn, Cook, Weed, Fletcher and others.

Prof. Osborn read the following note "On a Peculiar Form of Coleopterous larva":—Eleven years ago, while a student in college, I found a peculiar form of larva boring in the twigs of ash trees, and it was described at the time in the students' journal at the college (The Aurora, May, 1879, page 5,) under the caption "A Grub With Legs on its Back." The description is as follows: "The specimen was found boring in the pith of a small twig on an ash tree near the road west of the college, apparently beginning at or near the tip of the twig and working downward. Numerous twigs were found that had been inhabited in this way, but only one specimen of the borer was found—this about a quarter of an inch long, quite slim, and nearly white. Its great peculiarity consists in the disposition of its locomotive apparatus. The first three segments following the head are provided with the usual pair of legs, each in the normal position—that is, on the ventral surface. The following six segments are provided each with a pair of pro-legs, similar to those found on many caterpillars, but, strange to say, these are arranged upon the *dorsal surface*, exactly the opposite of the usual arrangement, while the number six is different from either the caterpillars, where there are four or five, or the saw-fly *larvæ*, which have eight. The remaining three segments have no propellers whatever. The beauty of this arrangement, for the conditions of the borer, can at once be seen, for it has as much foot-hold above as below. Placed upon a flat surface it could make no advancement, but wriggled awkwardly about, evidently seeking its double foot-hold. Placed between two thin plates of glass, it moved rapidly, using all its legs, and going with equal facility backward or forward, either side up. If provided with some support at one side it was possible for it to travel by means of the legs on its dorsal surface alone."

During the present season an example of a similar larva has come to my notice, specimens being first observed by Prof. L. H. Pammel, occurring in the stems of *Helianthus.* Their possessing similar locomotive organs upon the back called to mind the peculiar larva noticed years ago. They differ, however, somewhat in colour as well as in the plant on which they occur, and I find that they attacked voraciously dipterous larva that were living in the same stems. Whether they are normally carnivorous remains of course to be determined, but there can be no question of their attacks upon these larvæ, and apparently with the intent of obtaining food from them. These specimens are of a light bluish colour, possessing prolegs upon segments 4-9, inclusive, and a pair of tubercles on the ventral portion of the anal segment, as well as a dorsal tubercle on the terminal portion of the same segment. In general appearance there is a striking resemblance to the *Languria* larva, as shown in figure exhibited by Dr. Weed, but in his drawing there is no indication of the dorsal feet.

The Club convened at 5 p.m., and considered the following resolution :—

Resolved, "That it is the sense of the Club that the meetings of the Association of Economic Entomologists and of the Entomological Club would both be benefited by holding such meetings, if possible, at the same time and place as the meeting of the American Association for the Advancement of Science."

After discussion by Messrs. Fletcher, Osborn, Cook, Alwood, Weed and others, the resolution was unanimously adopted.

The Secretary read a paper by Prof. D. S. Kellicott, of Columbus, O., upon the "Preparatory Stages of *Eustrotia caduca.*" He had collected the larva upon *Nuphar advena* at Rives Junction, Michigan, in 1876. From these he had bred a moth, afterwards named by Mr. Grote *E. caduca* in the CANADIAN ENTOMOLOGIST, Vol. 8, p. 207. During July of the present year he had again collected the insect at Corunna, Michigan, and had succeeded in breeding and describing all the stages, which were submitted herewith.

The larvæ found in 1876 were feeding in the fruit, but those studied during this summer were found upon the leaves. If these latter were floating, the larvæ were exposed on the upper surface, in other cases they were beneath or concealed in folds. A different habit of swimming to that of *Arzama obliquata*, which progresses by horizontal undulations was noted. *E. caduca* swims strongly, but by an entirely different motion. The posterior third of the body is bent downwards like the tail of a crayfish and then quickly pushed backwards, thus driving the insect ahead by jerks.

Discussed by Messrs. Weed, Webster and others.

Prof. Cook reported having bred *Agrotis C-nigrum* through all its stages upon black currant, the eggs having been laid in a cluster upon leaves of that plant on 1st of June—the perfect insect appearing on the 1st of August.

Prof. H. Osborn read a note on the "Period of Development in *Mallophaga*." The habits of the species of *Mallophaga* render accurate observations upon the time required in development of the eggs a matter of considerable difficulty. While in some of the species upon very common birds it is possible to get an abundance of material, in other cases the opportunities for obtaining such material are very rare. But in the most common species the difficulty of determining the exact time of deposition of eggs, and then of keeping individuals in such conditions as to insure a normal development, makes positive observations difficult. This being the case, any observations which may add to our knowledge of the subject seem of interest, and the present note is offered as one such contribution.

The species chosen in the present case is the *Nitzschia pulicare*, which is almost invariably to be found in abundance on the common chimney swift (*Chætura pelasgia*). This bird is an abundant resident of the building in which my laboratory is located, and being readily obtained on account of its tendency to fly in at the windows, I suggested to Mr. P. H. Rolfs, a graduate student in biology, that he attempt the rearing of larvæ from eggs with a view to determine length of developmental period in connection with studies of its embryology.

For this first purpose he secured on two separate occasions a number of the eggs, and kept them, part in a tight paste-board box, which was kept warm by the heat of his body, the others were enclosed in cotton-plugged tubes under a hen that was kept in the laboratory at the time for incubating eggs for embryological work. Of the first lot, all kept in pocket, secured July 27th, two eggs hatched Aug. 4th, five between Aug. 8–13th, one Aug. 16th, the last giving twenty days, the longest period.

Of the second lot secured, Aug. 3rd, six hatched between the 8th and 13th, four hatched Aug. 14th (three in box and one in tube), two Aug. 15th (one in box and one in tube), part not hatching, and the longest period in this case being thirteen days.

Assuming that those requiring the longest time had been deposited but a short time before the experiment began, we should have from fifteen to twenty days as the ordinary time required for the eggs to hatch for this species.

Mr. F. S. Earle presented some interesting notes upon the injurious insects of the season in Southern Mississippi. *Diabrotica 12-punctata* was a very abundant insect, and in addition to its well known food plants it had been a serious pest to peach trees and cabbages. Leaves of the latter, bitten by the insect, at once decayed from the point of injury. Cut-worms were very destructive in gardens, and cucumber and melon vines were much injured by a plant-louse. Potatoes had been much attacked by a black flea-beetle, and the tomatoes by the boll-worm in the fruit, and on the leaves by the sphinx larvæ.

Prof. Cook would like to hear the experience of those present as to a practical remedy for the attack of the boll-worm upon the fruit of tomatoes.

Prof. Osborn said that Mr. Tracy had tried arsenical mixtures with some success, and also had attracted the perfect insects to light.

Miss M. E. Murtfeldt read the following paper:—

SOME EXPERIENCES IN REARING INSECTS.

In rearing insects, as with many other enterprises in life, we climb the ladder to success by the rounds of successive failures, having in many cases to exhaust an almost infinite range of "how *not* to do it," before arriving at its happy converse.

Many and great are the disappointments of the entomologist; but does he succumb? Never! What single point in the biology of a species has been relegated to the absolutely undiscoverable? I do not know of one, no matter how obscure the subject or how little advance has yet been made in the direction of its elucidation.

"Hope springs eternal" in the breast of the entomologist, and patience and perseverance have in him their "perfect work," until Nature relents, or is caught "off guard," and the secret, so carefully hidden, is revealed.

I am tempted to enumerate some of the discouraging circumstances encountered by the biologist in this field.

Among the *Lepidoptera*, a majority of the *Bombycidæ*, *Geometridæ* and *Noctuidæ* adapt themselves readily to the conditions of the rearing cage. They accept the food provided and make the best of it, even after it has become a little dry, which must sometimes occur when the care-taker is pressed for time. They thrive in the closer and darker air, and take such exercise as they require within their narrow walls of glass and wire-cloth, and when the metamorphic impulse comes they contentedly weave their cocoons in the corners of their prison, or bury themselves in the two or three inches of cemetarial earth in the bottom of the cage, and safely pass those mysterious transformations which give to this class of beings their pre-eminent interest.

But there is a great deal of individuality, or rather, specificality, in insects, and not infrequently specimens of larvæ are found for which the collector taxes his ingenuity in vain to provide. Not the freshest of leaves, the cleanest swept earth or the most well-aired of cages will seem to promote their development. They wander about the cage with an exhausting activity that pathetically suggests a realization of their imprisoned condition. They nibble languidly at their food, and aimlessly spin mats of web in inconvenient places, over the cracks of the door or cover, for instance, and, before long, comes the morning when they are discovered dead and discolored in the bottom of the cage, *and no more of them to be obtained until another season.* Or perhaps the cocoons are spun or the transformation to pupæ safely effected under ground, and the entomologist has full confidence that in due time he will obtain the much desired imago, and, when it may be expected, watches hourly for its emergence, and is rewarded by the appearance of an *Ophion* or a swarm of *Tachina* flies, or of some still smaller enemy, whose existence he did not even suspect.

Again, the collector may be obliged to delegate his cares temporarily to another, who, unused to the almost constant supervision necessary, suffers the precious larva to starve, or, by an oversight, tosses it out with the withered leaves, or crushes it in the hinges of the door, or, still more aggravating, thoughtlessly raises the cover and allows some long looked for imagine to dart out and escape through an open window. All that he will remember for the benefit of the person chiefly concerned, will be that it was a moth and " seemed something peculiar." As the entomologist cannot afford a separate cage for each species, and as he had probably put his choice unknown in with some well known forms of which he wishes simply to increase his duplicates, he probably grasps at the hope that the escaped insect was one of the latter, and so defers the full realization of his loss until weeks and months have passed and all his expected species have emerged, and then he hopes for better success another year, and finds " life well worth living" for this and similar reasons, which only an ardent naturalist can appreciate.

In some respects too much care is as subversive of success as too little. For instance, the very natural curiosity which the student feels to examine into the state of the insect after it has been buried for a short time in the earth. So he sifts the soil in his cage, and though he handles it with all caution, the frail earthen cell in which his treasure is enclosed falls in pieces, and the poor caterpillar in complete helplessness squirms in the loosened earth. Despairingly he tries with clumsy fingers to re-inclose it in the fragments of its cell, or attempts to form a substitute by packing the earth so that it may not be smothered. In vain. In ninety-nine cases in a hundred he never sees the imago.

While the hardy pupæ of most noctuids will bear any amount of handling, and by their activity will beat hard the earth about them at any time, a few species absolutely resent the least disturbance. I think that for seven or eight successive years Dr. Riley and I tried in vain to obtain the imago from a beautiful larva found every autumn in greater or less numbers on *Gnaphalium*, and occasionally on the Asters and some other *Compositæ*. Not being able to associate it with its species we designated it the " pretty cut-worm." It was Dr. Riley's practice to have the earth in his cages sifted occasionally during late autumn and winter to see how the pupæ were fareing, and to have each species collected into its particular corner or side of the cage, which was designated by the label on the door.

But in the case of this particular species this orderliness was fatal. After Dr. Riley went to Washington, I resolved on the "let alone" policy. I put the larvæ into a cage with clean earth with an admixture of sand which I dampened slightly and only at considerable intervals during winter, kept the cage in a very cool place, and the next summer was rewarded with several fine specimens of *Mamestra legitima*, my only disappointment being that it was a species by no means uncommon.

With me *Scopelosoma sidus* behaved in an almost equally capricious manner, but was, after many trials, finally reared by adopting the same methods as with *legitima*. I now make it a practice to sift or change the earth in my cages only in the spring and autumn before the hibernating pupæ are formed. Of course, if I wish to note pupal characteristics, I have to run the risk of the disturbance, but this is only occasional. I have found that frequent dampening, when the cages are kept in doors, is also detrimental, and that hibernating larvæ and pupæ are far less likely to suffer from drought than from dampness.

In rearing the Micro-lepidoptera—in which I have an especial interest—various tactics must be pursued, and the imagination is often vainly taxed to suggest a provision which the delayed changes and general unrest of the insect plainly call for.

Under natural conditions it is very difficult to keep track of these small creatures. The leaves or flowers or fruits on which they may be found feeding on one day will be deserted by the next, and during the darkness they will have betaken themselves to parts unknown, the most assiduous search failing to discover them. In the rearing jar some species adapt themselves very kindly; others will crawl about for days spinning threads of silk over sides and cover and finally dry up without effecting their transformations.

An accident to which the student is liable, and against which he can with difficulty make provision, is to have the larva, which he has perhaps just described and figured, escape. How often have I taken up a bottle in which I had been rearing a particularly precious unknown, and found a tiny hole in the muslin cover, or perhaps a little flap cut at the edge of the bottle, telling only too surely of the loss and delay which a further examination verified. The annual brooded species which appear in the spring are the *beteis noir* of the Micro-lepidopterist, especially such species as pupate on or just beneath the surface of the ground. They have to be cared for during the long, hot summer, as well as the autumn and winter, and to keep the safe middle course between the Scylla and Chaybdis of drought and of the dampness which would promote the equally fatal mould, requires the most careful attention. The annual brooded species which later fold or mine the leaves, or feed in the fruit capsules of various plants, or bore the stems, are comparatively easily reared, with a few exceptions. It was a number of years before I succeeded in obtaining the moth from an interesting larva which fed in the capsules of *Pentstemon.* This was owing to the peculiar change of habit during hibernation. After eating all the seeds from both divisions of the capsule, it would thoroughly line one all with silk, after cutting an aperature for escape, and ensconce itself, as might reasonably be supposed, for its winter's sleep. But no; the neatly lined cell was only a temporary abode, which, during the inclemency of mid-winter, was to be deserted for an entirely different one. Where, in the state of nature, I have not yet been able to discover. In my rearing jars it perished, year after year, to my inexpressible disappointment, until finally I wintered a number out of doors in a small wire cloth box closed with a cork. From this collection I at last obtained the moth—a beautiful *Conchylis*—from a larva that had bored into and transformed within the cork. But for two or three years I had only the single specimen, and next to the aggravation of utter failure I rank the possessor of an unknown unique. It may be new, and if sent to a specialist he will generally feel somewhat aggrieved if you reserve the right of description and further impose upon him the duty of returning the specimen. Then there is the danger of its destruction, either in the mail or express, to be braved, and yet, so long as one does not know the species, or be assured that it is new, one never can take full satisfaction in having bred it.

Last year I had the satisfaction of obtaining nearly a dozen imagines of the *Conchylis* in question by providing a number of bits of pith and cork in which the larvæ bored after their desertion of the capsules where they had fed.

Wherever I can make satisfactory arrangements for keeping track of them, I winter my Micro-larvæ and pupæ out of doors. Such species as bore the pith of stems are very easily cared for, and leaf miners and webbers I enclose on the surface of the ground, in some sheltered situation, under wire sieves or covers, bringing them in in the spring in order to have the little moths emerge where they can more easily be chloroformed or transferred to the cyanide bottle.

I must confess that I have never had signal success in rearing such species of the *Tenthredinidæ* as transform under ground. I have in mind more than a half dozen species—the larvæ of which are most interesting—of which I have so far failed to obtain the imagines, in spite of my utmost care.

The leaf and root-feeding beetles have always developed satisfactorily for me, but the *Cerambycidæ*, which feed on growing wood, have given me much trouble, and, in many cases, failed me utterly.

Orthoptera require but little care, as also do leaf-feeding *Hemiptera*, but the Cannibal species of both these orders are more difficult to cater to, and often refuse a diet that one would think would be irresistible. This is especially true of the carnivorous bugs which I have found require large space and ample provision to preserve them from fraternal rapacity.

With the aquatic orders I have had but little opportunity for experiment, but think they must furnish many very interesting subjects.

I believe that costly insectaries are being constructed by many entomologists, and no doubt will afford room for much thorough study of forms and habits. But such costly appliances are not absolutely necessary, and sometimes make observations more difficult than when the conveniences are more primitive.

A secure enclosure, fresh food, fresh air and clean water in the bottles are almost the only requisites in rearing the herbivorous species, and the more constantly the cage or jar is under observation the more thoroughly of course are the history and habits of the species revealed to us. When I wish to know all about a species, I keep the cage or jar on one corner of my desk and watch its occupant in the intervals of other work.

I cannot hope that I have conveyed much information in these notes to those who have gone over the same ground, but I am at least sure that I have recounted some of the experiences of every biological student of insect life, and can sympathise in his disappointments and appreciate the satisfaction of his successes.

Friday, August 22nd.—The Club met at 8.30 a. m. Dr. Weed presented a short paper on the habits of *Lixus concavus*.

As reported in the bulletin of the Ohio Ex. Station, Mr. Alwood had found this insect injuring the stems of rhubarb. During the past summer he had bred it from all parts of the stem of the common curled dock.

Prof. Alwood stated that he had observed the larvæ of *Gortyna nitela* eating those of *Lixus*.

Dr. Weed read a paper upon the habits of *Psephenus Lecontei*.

Prof. Webster and Mr. Fletcher also spoke on the habits of this beetle.

Prof. Hargitt read a note upon a large foliaceous gall which destroyed the tips of the stems of various species of *Solidago* at Bloomington, Indiana. In many instances as many as ninety-nine per cent. of the flower stems had been destroyed.

Prof. Hargitt read a note upon the Canker Worm. He said: "My attention was drawn to an orchard near Oxford, Ohio, which, for three or four years, had been seriously affected by this pest. In May, 1890, I went to examine the orchard and found it thoroughly over-run by the larvæ, many of the trees being actually dead, and several others in a very weak condition. The orchard, viewed at a distance, had the appearance of having been burned, the leaves being brown and dead. The trees were most attacked upon the outer rows, particularly those adjoining a wood. I recommended spraying with one of the arsenites, but it was too late for the present season. I observed several small birds in the orchard actively engaged in feeding upon the larvæ, amongst them the cedar bird, blue bird, summer warbler, chipping sparrow and field sparrow."

Prof. Hargitt also read a note upon *Cermatia forceps*. He had found that this Myriapod had become abundant in houses and the college building at Oxford, Ohio, during the past two or three years. He had experienced the same difficulty in keeping the insects alive in captivity, as was mentioned by Dr. Lintner in his 4th Report. He had succeeded in keeping them for several days and inducing them to take prey by keeping them in dark quarters in a tin canister during the day. When so confined they had fed freely upon house-flies, and other insects supplied them.

Prof. Webster spoke of the predaceous habits of *C. forceps*, and its special fondness for the Croton-bug (*Ectobia germanica*).

Mr. Fletcher had observed the insect when visiting Mr. Howard at Washington, D. C., who had described to him its remarkable habit of capturing the Croton-bug by springing over it and thus encaging it beneath its many curved legs. He was of the opinion that those who had failed to keep this insect in captivity had done so from omitting to supply a sufficiency of moisture, and thought that Mr. Hargitt's success in the instance mentioned, where the insect was put in a tin can, was more due to this cause than to the darkness. *Myriapods* are generally found in damp, dark places.

The Club proceeded to elect officers for the ensuing year. Prof. Cook, the retiring President, congratulated the members upon the harmony which had existed throughout the sessions, and was glad to find that, although some old and pessimistic members of the Club had predicted that it had run its course and would soon flicker out like a spent candle, he was glad to find that the present meetings had not only been the best attended for many years, but that the discussions and papers had been equally interesting to those of any meeting which he had had the pleasure of taking part in. He wished the Club every success and trusted that it would grow stronger and stronger every year. The following officers were elected :—

President, Prof. Herbert Osborn, Ames, Iowa.

Vice-President, Miss Mary E. Murtfeldt, St. Louis, Mo.

Secretary, Dr. C. M. Weed, Columbus, Ohio.

Prof. Osborn, at the invitation of the President, introduced the subject of the use of contagious diseases in combating injurious insects. He said that he had already published a paper in the Transactions of the Eastern Iowa Horticultural Society for 1886, pp. 400–405, upon this subject; but that it was of such importance that he desired to hear it discussed by the members of the Club. He first mentioned the well-known fungous and bacterial diseases which attack insects, as Muscadine, Grassen or Jaundice, Pebrine, Flacherie or Flaccidity, Foul-brood of Bees, Fly and Grasshopper Fungus, and the White-grub Fungus, and called attention to the fact that we were already able to control those which affect important domestic species, as Silkworms and Bees, and that to some extent at least we are able to control those available as agents in destroying injurious species. After considering the various conditions limiting the applicability of this means, he drew the following conclusions :—

(1) That there are diseases amply sufficient as a basis for economic work, the bacterial forms giving the most promise for all cases where early results are desired, while those due to fungi, so far as present knowledge goes, propagating slowly, can only be used as slow but efficient checks to injurious forms, the most that we can do with them being to introduce them in localities where they are not already found.

(2) That the diseases can be controlled to the extent of preserving the germs for a season and transporting them from place to place to use for inoculation, but that their spread in nature will be affected by conditions beyond control, while only such insects as occur gregariously, or live in mingled hosts, can be attacked to advantage.

(3) That the cost of application would prevent its adoption except in certain forms.

(4) That we must consider this method of contending with insects at best as but one of a number of profitable methods to be used in certain cases where other methods are insufficient, and to supplement other methods when it can be done to advantage. With this end in view, the diseases of insects are worthy of the most careful study, and will not, he thought, disappoint the investigator in their final results.

Mr. Fletcher thought that the chief difficulty with regard to these fungous diseases was their cultivation so that they might be available at the time when needed. One trouble with him had been carrying them over the winter.

Prof. Hargitt spoke of a fungous disease which had attacked the canker worm.

Prof. Cook thought the greatest difficulty in making use of contagious diseases for the destruction of insects was the fact that the insects which it was desired to treat were not always in a susceptible condition.

Prof. Garman thought that although fungous diseases were difficult to introduce, bacterial diseases would probably be more controllable.

The meeting adjourned till 5 o'clock.

Prof. Atkinson spoke on the "Injurious Insects of Alabama." A bud worm had been extremely injurious to young corn, piercing the central shoot and destroying its growth. *Diabrotica 12-punctata* had also been injurious in the same manner; and, if there were not sufficient food in the stem, the larvæ descended to the roots and tunnelled out irregular channels on the surface. They pupated in the ground. A new attack had been observed on the "Irish potato," viz., by the Cabbage Plusia, which had attacked the leaves. The same insect had been very injurious to cabbages. In the Southern part of the State more harm had been done by the Plusia than by the cabbage worm. At Mobile farmers had complained that 50 per cent. of their melons had been injured by a worm. *Scolytus rugulosus* had been very abundant at Auburn in the spring, attacking trunks which appeared to be perfectly sound. Onions had been badly injured by a species of Thrips. Another species had also been injurious to cotton plants.

Prof. Cook stated that he had also seen a Thrips injuring onions in Michigan.

Prof. Webster stated that he had studied *Scolytus rugulosus* and had found that it invariably attacked trees which were injured. In a single instance, where the beetles had commenced operations on a sound tree, he found that they afterwards left it.

Prof. Cook made some remarks upon the effect of mild winters upon insect presence. He had found cut-worms and saw-flies very abundant in Michigan during the present season. He had also bred a new borer from the black currant, *i. e.*, the small longicorn beetle *Hyperplatys maculatus*. He had also found that the larvæ of *Aegeria tipuliformis* had been largely destroyed by a fungous growth like that of the white grub. The leaves of cherry, pear and quince had been badly attacked by the larvæ of saw-flies, but they had been easily kept in check by applications of road dust.

Dr. C. M. Weed presented a paper upon the "Oviposition of *Dectes spinosus* upon *Ambrosia trifida*." He also gave some account of the insect, in all its stages, from specimens which he had bred.

During the meeting a most interesting set of photographs was exhibited by Prof. Webster, showing a likeness of Thomas Say, his birthplace, the house where he lived during the greater part of the time he was writing his works, his tomb and an autograph. Prof. Webster had a few sets of the photographs struck off when his own were printed and is willing to let entomologists have them at the actual cost of production.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

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

(*Continued from page 208, Volume xxii.*)

H. roseata Wlk.

1866—Wlk., App. to Lord's Trav. in Vanc., 336 (?), *Halisidota*.

cinnamonea Bdv.

1868—Bdv., Lep. Cal. (Ann. Soc., Belg., XII.), 80, *Phægoptera*.

1869—Grt. & Rob., Trans. Ann. Ent. Soc., III., 175, *pr. syn.*

Habitat—Vancouver, Calif.

As the description of this species is not readily accessible to students, I reproduce it here :—

"Female rosy red; body densely clothed, and partly pale yellow beneath; head with a pale yellow band on the front; palpi extremely short; thorax with six longitudinal pale yellow streaks; abdomen rosy, lanuginous and partly yellow to the base, extending much beyond the hind wings; fore wings with some pale yellowish streaks toward the base, with three exterior whitish macular, very oblique bands; spots mostly cuneiform; costa straight; tips slightly acute; exterior borders slightly convex, extremely oblique; first and second inferior veins contiguous at the base; third very near the second; fourth remote from the third; hind wings whitish cinereous, slightly hyaline; veins and fringe slightly yellowish. Length of the body, 7 lines; of the wings, 20 lines.

"This species may form a new genus. It differs somewhat from *Halisidota* in the structure of the veins of the fore wings."

H. scapularis Stretch.

1885—Stretch, Ent. Amer., I., 106, *Halisidota*.

Habitat—New Mexico.

H. significans Hy. Edw.

1888—Edw., Ent. Amer., III., 182, *Halisidota*.

Habitat—New Mexico.

H. sobrina Stretch.

1873—Stretch, Zyg. and Bomb., 87, 135, pl. VI., f. 10, ♂, *Halisidota*.

1873—Edw.*, Proc. Cal. Ac. Sci., V., 369, *Halisidota*.

Habitat—California.

Food-plant—*Pinus insignis*.

H. tessellaris Sm. Abb.

1797—Sm. Abb.*, Ins. Ga., II., 149, pl. 75, *Phalæna.*
1816—Hbn., Verzeichiss, 170, *Halisidota.*
1837—Geyer, Zutr., No. 470, ff. 939-940, *Halisidota.*
1833—Harris, Cat. Ins., Mass., 592, *Arctia.*
1841—Harris*, Rept. Ins., Mass., 260, *Lophocampa.*
1856—Wlk., C. B. Mus., Lep. Het., III., 732, *Halisidota.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII, 534, *Halisidota.*
1862—Morris, Synopsis App., 348, *Halisidota.*
1862—Harris*, Inj. Insects, 364, *Lophocampa*
1863—Saund.*, Syn. Can. Arct., 19, *Halisidota.*
1864—Walsh*, Proc. Bost. Soc. N. H, IX., 289, *Halisidota.*
1870—Walsh*, Am. Ent., I., 205, *Lophocampa.*
1873—Stretch*, Zyg. & Bomb., 87, 137, pl. VI., f. 9, ♀, *Halisidota.*
1882—Grote, New List, 16, *Halisidota tessellata.*

antiphola Walsh.

1864—Walsh*, Proc. Bost. Soc. N. H., IX., 288, *Halisidota.*
1864—Walsh*, Proc. Ent. Soc., Phil., III., 412, 413, *Halisidota.*
1864—Grt., Proc. Ent. Soc., Phil., III., 536, *pr. syn.*
1865—Walsh, Proc. Ent. Soc., Phil., V., 197, *pr. syn.*

var. harrisii Walsh.

1864—Walsh, Proc. Ent Soc., Phil., III., 430, *Halisidota.*
1865—Walsh, Proc. Ent. Soc., Phil., V., 197, *pr. var.*
1870—Walsh, Am. Ent., I., 205, *Lophocampa,*
1873—Stretch, Zyg. and Bomb., 137, *pr. var.*

Habitat—Canada to Texas; Illinois, Indiana, Missouri.

Food-plants—Oak, sycamore, beech, hornbeam, plane.

H. trigona Grt.

1879—Grt., No. Am. Ent., I., 46, *Halisidota.*
1881—Grt., Trans. Kans. Ac. Sci., VII., 64, *Halisidota.*

Habitat—New Mexico.

Genus EUHALESIDOTA, Grt.

1865, Grt., Proc. Ent. Soc., Phil., V., 243.

Head moderate; eyes large, not prominent; tongue of medium length, corneous; palpi short, scarcely exceeding the front; terminal joint very short; antennæ long, in the male heavily pectinated; legs increasing in length posteriorly; spurs normal in number and moderate in length.

In venation I can find no notable differences from *Halisidota*, and the only examined species, *longa*, alone considered, I cannot find *any* difference save in the wing form. In *Euhalisidota* the primaries are longer and more pointed. Mr. Grote, in describing the genus originally, had only a single rubbed female before him, and pointed out some distinctive characters which seem inconstant.

E. longa Grt.

1880—Grt., CAN. ENT., XII., 213, *Euhalisidota*.

Habitat—Florida.

E. pura Neum.

1882—Neum., Papilio, II., 133, *Euhalisidota*.

Habitat—Arizona.

Genus ALEXICLES, Grt.

1882—Grt., Trans. Kans. Ac. Sci., VIII., 46.

Eyes hairy, head produced; the thick clypeal vestiture conceals the small palpi; abdomen short, male antennæ pectinated; wings rather long and narrow, entire, sub-diaphanous. Cell in primaries closed, veins 3–5 arising near together.

The above genus is unknown to me, and the characters given are from Mr. Grote's description, and all that he gives. He says, "In placing it among the *Arctians* I have probably not found its best place." No family characters are given; so it is impossible to guess where the genus belongs. The neurational characters given are as much *noctuid* as *arctiid*, while the origin of vein 8 of secondaries, which would have probably decided the propriety of its reference to the *Arctians*, is not mentioned at all. In fact, except by the identification of the species, the genus is not recognizable. The species is *A. aspersa* Grt.

1882—Grt., Trans. Kans. Ac. Sci., VIII., 46., *Alexicles*.

Habitat—New Mexico.

I have now gone over all my notes in the family. The bibliography is probably not complete, but it embraces references to the descriptions of all the species and nearly all the genera. By far the greater number of references are original, and nearly all have been verified. The notes on the structural characters have gradually accumulated, as I rarely lost an opportunity of making an examination of a species coming into my hands, nor of noting the contents of books which I found occasion to examine in my studies on the *noctuidæ*. In arranging the *Arctiidæ* of the National Museum collection it became necessary to examine some of the species for determination, and the facts gleaned in this way were noted. The localities given are very incomplete, as here I failed. I neglected localities for structure, and the list does not, therefore, give a fair idea of the distribution of many of the species.

The economic literature has been almost entirely omitted, since it rarely became necessary for me to refer to it. Mr. Hy. Edwards's list of the early stages will supplement the present catalogue in this respect. The object sought here is to bring within reach of the student the knowledge of where the literature of the family can be found, if he desires to study it systematically. I have also given my own observations which may serve as a starting point for others, and may aid in determination and a knowledge of the characters upon which the genera are based.

SYNOPSIS OF GENERA.

1. Front tuberculate or roughened 2
   Front smooth 3
2. Anterior tibia unarr :d; accessory cell wanting............ *Cydosia*
   Anterior tibia with a claw at tip; primaries with an accessory cell .... *Cerathosia*
3. Vein 5 of secondaries wanting or very faint................ 4
   Vein 5 of secondaries present.............................. 5
4. Primaries long and narrow, secondaries broad and large.... *Emydia*
   Primaries broad, secondaries smaller, proportionate .... *Crocota*
5. Vein 8 of primaries wanting; 11 veins...................... 6
   Vein 8 of primaries present; 12 veins 7
6. Vein 10 of primaries from the subcostal; 3 and 4, and 6 and 7 of secondaries stalked.......................... *Gnophæla*
   Veins 7 to 10 of primaries on a stalk out of the end of the cell; veins on secondaries not stalked............... *Epicallia*
7. Vein 10 of primaries from the subcostal 8
   Veins 7 to 10 of prima'ies stalked out of the end of cell........13
8. Accessory cell present on primaries........................ 9
   Accessory cell wanting on primaries........................10
9. Antennæ of ♂ bipectinated.................................. *Nemeophila*
   Antennæ of ♂ with single lateral bristles only.
   Primaries narrower, parallel, apices rounded; secondaries large, broad .... *Utetheisa*

Primaries broader, trigonate, apices marked; secondaries proportionate .... *Callimorpha*

10. Tongue weak and short 11

Tongue moderate or long 12

11. Fore tibia with a small spine at tip, wings broad and large.. *Euprepia*

Fore tibia unarmed.

Wings broad, size large .... *Platarctia*

Wings moderate, size smaller .... { *Arctia* / *Callarctia* }

12. Primaries broad, apices not produced, secondaries proportionate .... *Euchætes*

Primaries broad, apices produced, acute, secondaries small .... *Eupseudosoma*

Primaries narrow, with greatly produced apices, secondaries still smaller .... { *Halisidota* / *Euhalisidota* }

Primaries still narrower, size smaller .... *Nelphe*

13. Vein 8 of secondaries wanting .... *Euerythra*

Vein 8 of secondaries present 14

14. Median spurs of hind tibia wanting 15

Median spurs of hind tibia present 18

15. Anterior tibia armed at tip 16

Anterior tibia unarmed at tip 17

16. Tibial armature consisting of a long claw .... { *Seirarctia* / *Ectypia* }

Tibial armature consisting of a stout spine each side of tip; ♀ antennæ pectinated .... *Leucarctia*

Tibial armature consisting of a small spine at each side of tip; ♀ antennæ simple .... *Hyphantria*

17. Primaries broad and obtuse, secondaries proportionate.... *Leptarctia*

Primaries long, apices acutely produced; secondaries small, caudate .... *Ecpantheria*

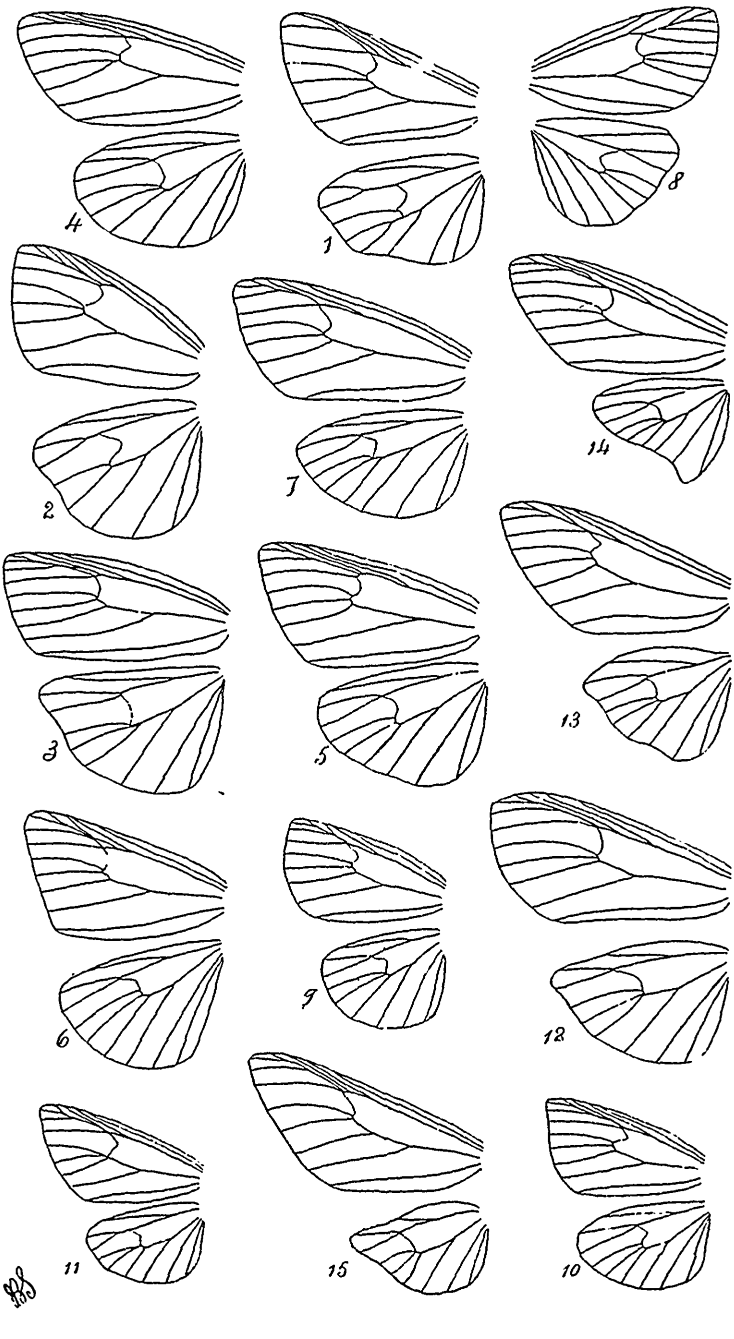
18. Antennæ of ♂ pectinated 19

Antennæ simple in both sexes 20

19. White species with more produced apices .... *Spilosoma*

Tawny species with broader, more obtuse wings .... *Antarctia*

20. Primaries narrow, elongate, apices acute; secondaries rounded; vestiture dense; color tawny .... *Pyrrharctia*



(SEE PAGE 236.)

Primaries broader, apices marked, but hardly acute; vestiture thin; color reddish.................. *Phragmatobia*

Primaries still broader, apices long acute; secondaries subcaudate; size large .... *Arachnis*

The synopsis shows plainly the close relation of some of the genera, though the series is arbitrary in its arrangement. Excluding the *Cydosiinæ*, which perhaps indicate a tendency to the Noctuidæ, we have two fairly distinct series. In the one we find a usually small head, somewhat retracted, and more or less obsolete tongue. The antennæ are moderate in length or short. In the other series, the head is larger, more free, the tongue stronger and longer, and the antennæ are usually longer and more prominent. The position and origin of vein 10 serves as a good basis of division, and this corresponds to some extent with the other characters. The entire family needs further revision. The genera allied to *Arctia* are scarcely sufficiently distinguished, and so *Euhalisidota* seems scarcely distinct from *Halisidota.*

Melanchroia, *Daritis* and *Kodiosoma* are not included in the synopsis. *Ectypia* and *Nelphe* are placed partly by guess, from lack of types for examination.

Eupseudosoma has been sent me by Mr. Conradi, and is a close ally of *Halisidota*, differing in the broader primaries, and very long oblique outer margin.

Finally, the present paper consists rather of a series of notes preparatory to a study of the family, than a critical study. With a good collection at hand, there should be no difficulty anywhere in the family, except perhaps in *Halisidota.*

EXPLANATION OF PLATE.

1. Venation of *Gnophæla hopfferi.*
2. " " *Crocota ferruginosa.*
3. " " *Utethesia bella.*
4. " " *Epicallia virginalis.*
5. " " *Euprepia caja. Arctia* does not differ.
6. " " *Nemeophila.*
7. " " *Scirarctia echo. Leucarctia* and *Pyrrharctia* do not differ.
8. Venation of *Phragmatobia rubricosa.*
9. " " *Antarctia vagans.*
10. " " *Spilosoma virginica.*
11. " " *Hyphantria textor.*
12. " " *Euchætes egle.*
13. " " *Arachnis picta.*
14. " " *Ecpantheria scribonia.*
15. " " *Halisidota caryæ.*

Cydosia and *Cerathosia* were figured in the Proc. U. S. Nat. Mus. for 1888; *Callimorpha* and *Euerythra* were figured in the same publication the year previous.

NOTES ON COLEOPTERA—NO. 6

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

Corymbites nigricornis Panz. (*metallicus* Payk. *nitidulus* Lec.) This species is widely distributed in North America, from Hudson Bay to Massachusetts, and westwardly to the Rocky Mountains, through which it extends to New Mexico. It also inhabits Siberia, Central and Northern Europe. The typical form (European) is described as metallic black. with the two basal joints of the antennæ and the feet rufous. The Ar ican forms found in Northern Michigan and at Sudbury, Ontario, agree with this description, except that I have seen no example with more than the first basal joint of the antennæ rufous. Moreover, specimens occur with the hind angles of the thorax rufescent, and the feet varied in different ways from rufous to entirely brown. From the more southern parts of Canada and from Massachusetts comes a form with a narrow margin and the hind angles of the thorax, its inflexed sides, the prosternal lobe, the epipleura of the elytra, sides of the abdomen and narrow posterior margin of the ventral segments rufous; the feet varying in colour, as in the typical forms.

Except in colour there appears to be no other separative, but this is so striking that it is not obvious, without some study, that the forms are all one thing. No such variation seems to have been recorded among the European forms.

Petalium bistriatum Say.—This is a very small thing, from .04 to .08 inch in length, black, with rufous feet and antennæ, and is frequently beaten from bushes by the collector. There is a form raised abundantly from dead hickory of two years, that is entirely castaneous, with the other characters noways different, except that the dorsal striæ of the elytra are fairly well marked, the intervals with rows of fine soft hair, and the 8th joint of the antennæ, though still short, can be seen in life with a lens; whether this is sufficient difference to be the basis of another species is left to the future monographer. The genus is readily known from all others in this difficult family by the large metasternum projecting forward separating widely the middle coxæ, and by the second ventral segment of the abdomen being as wide as the remaining three conjointly. The insects of this family have a very provoking habit of tucking away the antennæ and folding the legs so as to elude observation without a troublesome process. I find it very satisfactory to collect them alive and to place them on the slide of the microscope in a drop of chloroform, which quiets them for a minute, and when reviving the antennæ and legs are extended slowly and may be seen rather better than by dissection.

Raised from the same wood with the above was a specimen of *Hadrobregmus* .18 inch long with eleven jointed antennæ, which if not *pumilus* is a new species, the size constituting the principal difference observed.

Several examples of *Xyletinus peltatus* were likewise bred from this wood.

Purpuricenus axillaris Hald. (Tr. Am. Phil. Soc., X., 31).—This fine species is not uncommon here, and this season numerous examples were bred from hickory wood deadened two years and one-half ago. In the catalogue it is set down as a variety of *humeralis* Fab., but the reason is not very obvious. It is smaller, .45 to .65 inch, (Haldeman gives, .50 to .75 inch, but in over 100 examples I never saw one over .65 inch, .50 to .55 inch being the usual length); cylindrical in outline; thorax moderately foveate-reticulate; elytra sparsely moderately punctured on the basal third, which is mostly of a pale lemon color to orange yellow; the apical two-thirds is entirely black, the anterior portion of which is punctured a little more finely than the yellow portion, and the posterior very finely and densely; a black hair arises from each puncture forming a dense pile that completely conceals the punctuation; the underside is moderately finely sparsely punctured; the black and the yellow portions of the elytra are separated transversely by an irregular border, though the black has no tendency to advance along the suture, but rather the reverse.

Humeralis is larger, .70 to 1.0c inch, considerably depressed and broader in proportion to the lengths; the thorax is very rugosely foveate-reticulate; the elytra on basal third are coarsely sparsely deeply punctured; the punctures on the apical black part are somewhat finer but not dense, and are not concealed by the black hairs; the underside is coarsely punctured; the apical black of the elytra advances normally along the suture to the scutellum, leaving a triangular basal space on each side extending to the marginal third of a bright scarlet color, but sometimes orange. In some individuals the basal spot becomes dilated posteriorly so as to be separated only by a black sutural line, and then the specimen resembles *axillaris*, but only in coloration. To me they are separate species.

Dorcaschema nigrum Say.—This species requires two years for development, breeding in dead hickory limbs, from a barrel of which more than 500 specimens were obtained from June 3rd to 25th. The larvæ live under the bark till May of the year in which the beetle appears. As the time for pupation approaches they develop an enormous appetite and eat broad cavities in the wood under the bark through which their dust is ejected by a perforation. Some of them pupate in these cavities in which they partition off a suitable space with a wall of compacted dust; but the greater number bore obliquely into the wood to a greater or lesser depth and distance and then outwardly again till near the surface, packing their burrows solidly. The larvæ do not bore entirely to the outside, but stop short one-eighth to one-sixteenth of an inch, leaving the remainder of the wood and the bark to be cut through by the matured beetles, which are just as capable of boring a hole as the larvæ. And in this connection I would state that I have ascertained this season that in the case of Saperda Fayi and S. concolor, the beetles, and not the larvæ, bore the holes to escape by. In the pupa state the very long antennæ are coiled into a spiral of three and lie on the wing pads. In the development probably one-fourth of the beetles are unable to free the entire antennæ from the envelope and appear with one or both deficient in some of the external joints.

Tymnes metasternalis Crotch.—This species appears to be rare among collectors. Crotch described it from Illinois briefly: "Very similar to the preceding [tricolor, the bronze variety], but elytra more sparesly punctate, subcostal; metasternum and ventral segments closely and deeply punctate. L. .22 inch." This season I took twenty-five examples of a form that suits this description well enough, except that in length they measured from .16 to .19 inch, which represents a much smaller insect, but which for the present may bear the name. In *tricolor* the metasternum is scarcely sparingly punctate and highly polished, and there are scarcely any abdominal punctures. This, with the much larger size and more convex form, are sufficient distinctions. With *Rhabdoptera picipes* Oliv. (*Colaspis prætextata* Say) it may be very readily, and probably is, often confounded, as they are nearly of the same size, colour and sculpture, but the underside of *picipes* is smooth like in *T. tricolor* and the tibiæ are not produced at the apex to a point. The beetles were beaten from a small *Cratægus* growing in a fence corner at the edge of a large grove on June 2nd, 6th and 12th, many of them paired; other bushes of the same species nearly yielded none. *Tymnes tricolor* is rather abundant, varying in the colour and sculpture of the upper side; the bronze coloured is the largest and roughest, occurring in June and July, usually on chestnut; the green variety is found at the same time on hickory, individuals being sometimes bright blue and an occasional one bright coppery. I once took two of the green variety early in April in hibernation, though this is probably an exception to its habit.

Tymnes chrysis Oliv.—This species when found is abundant, but it seems to occur in localities. So far, it has been taken on hickory sprouts growing from stumps, and occurs in June and July. As it has not been described in American works I give a translation of Olivier's: "*Golden-green, thorax and elytra punctate; antennæ and feet rufous.* Like *T. viridis;* antennæ, palpi, labrum above and feet rufous; body green or brassy-green. Sometimes brassy-green, brilliant, shining; head, thorax and elytra punctate. New York, Georgia." Oliv., Vol. 6, 886, No. 16, and figure. *T. viridis* Fab. is the green form of *tricolor*, which is more brilliant in the Southern States, whence were Olivier's specimens. Olivier's description is applicable as far as it goes, but a greater abundance of material shows more variation. The large majority of examples are greenish blue to cobalt blue, while violaceous and bright coppery individuals occur; in some examples the thorax is of one of these colours and the elytra of another; the antennæ are often darker outwardly; the femora are usually piceous black, with the tibiæ and tarsi pale. This is varied in different ways, and sometimes all are piceous. The underside is black or piceous, shining, sparsely, finely and irregularly punctate. Length .18 to .20 inch. This species has the thorax and elytra smooth and rather closely and evenly punctate, and without the elytral rugosities of the other species, and arranged by this character it would be the first or the last of the series.

Rhabdoptera (Colaspis) picipes Oliv. (*prætextata* Say).—Olivier describes his *picipes* as having the thorax *finely* punctured, and as being a little *larger* than *Tymnes (Colaspis) viridis* Fab., the green variety of *T. tricolor*. It is difficult to find a North American insect in full accord with this description if rigidly interpreted. The bronze form of

T. tricolor with which it has been united has the thorax not very coarsely but still not finely punctured, and in this respect does not quite answer, though usually a little larger than *viridis*.

Rhabdoptera prætextata Say, with which Dr. LeConte formerly united it, and more recently Dr. Horn, with the precedence, has the thorax punctured as in *tricolor*, and is too small by nearly one-half. Olivier's description translated is: "*Beneath piceous; above shining, fusco-æneus; antennæ testaceous, apex black, a little larger than C. viride* Fab. Antennæ testaceous, last two joints fuscous; body above shining, beneath piceous; thorax finely punctate; elytra punctate with confluent punctures. Throughout Carolina." A figure accompanies this description.

This is as good a description of the bronze form of *tricolor* as Olivier gives of either *viridis* or *chrysis*, and as the same exactness of expression did not prevail then as now, the really not very coarsely punctured thorax might have been considered fine by him. It seems scarcely just to Mr. Say to supercede his name, accompanied by a fairly good description, by one that, according to the describer, applies to an insect nearly twice the size and which, like a hermit crab, has been wandering about a long time in search of a suitable shell. In neither of the two species are the elytra confluently punctured. This species is distributed from Canada to Florida and westward to the Rocky Mountains. It occurs here abundantly on the *Vitaceæ*, especially the wild grape.

There is an undescribed species of *Colaspis* or *Rhabdoptera* (if the genus is valid) found in North Carolina, of which I have examples, which is of the proper size to suit the description of *picipes*, has the elytra what may be termed rugosely punctured, and the thorax scarcely more coarsely than *tricolor* or *prætextata;* but it is brilliantly green above. There may, however, be examples, as in nearly all similarly coloured insects, of bright golden or coppery individuals, and if so, it would fit Olivier's description better than either of the other species. There is a difficulty that must be met, or satisfactorily explained, before there can be certainty in any assignment, that is; the name "*picipes*," and the statement that the underside is "*piceous*." Olivier, in describing the other species, names the colour of the legs, which he here does not do, and the legitimate inference with the name given is that he had before him an insect with dark legs, which neither of the species mentioned nor the nondescript has, and with little tendency to in any individual observed. Possibly the insect described may belong to some foreign country.

Haltica ignita Ill.—This species is so protean in colour, form and in the wide range of the vegetation it affects, that it is difficult to believe all the forms included under this name really belong to one species till one looks for tangible structural differences. It has a very extended distribution, from the Hudson Bay region to Florida and Texas, and was described by Dr. LeConte, from Fort Simpson, on the McKenzie river, under the name *incerata*. It is easily separable into at least three races, two of which occur here in the greatest abundance. The first is the typical form, having the upper side of a brilliant golden-copper colour, though individuals occur with it violet or green. It is found during May on Azaleas growing among huckleberry. A colour variation of this form is found at the same time on Kalmia, with the upper side entirely green, individuals occurring of a coppery and violet colour, or with the thorax violet, or coppery and the elytra green. The length of this form is from .14 to .17 inch; the punctuation of the elytra is comparatively coarse and not very close.

The second form is much smaller, .11 to .13 inch in length; the punctuation of the elytra is finer and less distinct; the form is less elongate, and more depressed; the colour of the upper side is either green or violet, but individuals occur with all the variations of the preceding. It appears here about the first of June and depredates on the Rosaceæ, seeming to have a special fondness for the wild plum, wild cherry and wild strawberry. I have this variety from New Jersey, Florida and Texas; the preceding, from Wisconsin, Michigan and Canada. Dr. Horn, in his Monograph of the genus, mentions a deep blue race, and likewise a brown race without metallic lustre, as occurring in Florida, but I have met with neither. This species is distinguished from all others except *chalybea* and *nana* by the *deep* ante-basal groove of the thorax, which extends *completely* across to the marginal depressions.

Mailed November 5th.