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NOTES ON ANT LIONS.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

One day on my late visit to Ridgeway, a party of four went on an entomological excursion by boat to a place about four miles west, called Point Abino. After taking a survey of the situation and lightening our lunch basket, we went to work. Each had his specialty; one desired beetles, another butterflies. Seeing *Myrmelion* on the wing, I turned my attention to the Ant Lions. I did not succeed in securing many of them, for although the funnel-shaped pits of the nymphs were in surprising numbers, very few of the mature insects were to be seen, it being probably a little too early for them. I captured but four specimens, one *obsoletus*, and three of what was kindly determined for me by Dr. Hagen, of Cambridge, Mass., as *Myrmelion abdominalis* Say, whose figured-gauze wings are charming objects seen through a lens. The slight acquaintance I have with them has been acquired during my visits to Ridgeway, none of them having ever been seen about Hamilton so far as I know. Mr. J. Pettit secured an *obsoletus* while he was collecting at Grimsby, but I think he never got a second, although no doubt they were there to some extent, but probably very scarce. Fine loose sand is evidently a necessity of their existence in any locality, and I would suppose comparative seclusion; both of these they have in perfection at Point Abino. I saw large patches of sand so loose that weeds could not take root upon it, and which had not been disturbed by the foot of man or beast probably for weeks, and some of these places were so occupied with their pits that it did not seem possible to get another one in without interfering with those already there. These pits were about three inches across the top, and two or two and a half deep. Their width must be in exact proportion to their depth, for the slope of the sides is just what will support the particles of loose sand. They must have their pits to make frequently during their larval existence, for every heavy shower will fill them all up. They never expose themselves to view except by accident, but lie just immediately under the

surface. The larva is provided with an apparatus for throwing up the sand, which it can do with sufficient force to scatter it for four or five inches around, and with the rapidity at times of the tick of a watch, working itself downwards as it throws off that above it, the sand flowing in as it deepens, which it jerks up again, the most of which falls outside the range of the pit; and so continues the operation until the required dimensions are obtained, when it lies perfectly still at the bottom and awaits events. An industrious ant out on a foraging expedition, in the hurry of its eager search runs over the edge of the pit. The lion at the bottom seems to be instantly aware of the fact, and begins throwing up jets of sand with great rapidity, which come showering down, frightening the ant, and it makes frantic efforts to get out; but the mere vigorously it scrambles for the top, the more rapidly it slides to the bottom, where it is at once seized. The struggle ensuing dislodges the loose sand, and a miniature avalanche pours down from all sides, which materially assists the lion to secure its victim, and the ant is soon taken out of sight. I am not aware that it has any means of enticing its prey, and as it does not go searching for it, but is entirely dependent on what happens to come in its way, I suspect it must have many a long wait between meals.

The mature insect is neither a rapid nor a graceful flier, but flaps its wings in a heavy, clumsy manner, quite different from what one would expect in so exquisitely delicate a creature. It prefers to alight in an upright position, and rests with its wings folded close to its sides.

AN ICHNEUMON PARASITE OF MAMESTRA PICTA.

BY F. B. CAULFIELD, MONTREAL.

On July 19th, 1881, a caterpillar of this moth was found on a cauliflower which had been brought from market, and was placed in a tumbler with some of the leaves. By the 21st it had shrunk considerably in size, and was greatly changed in appearance, the black and yellow markings that make this larva so conspicuous an object having faded to a dull whitish color. On the 22nd it was lying on the bottom of the glass and was revolving continuously. Under natural conditions it would, I believe, have entered the earth to go through its transformations, and the curious revolving motion might perhaps have been for the purpose of forming and smoothing its cell. On looking at it on the morning of the 23rd, a soft

white flattened ichneumon larva had issued from it, and had commenced the construction of its cocoon by spinning a few white threads. By evening it had surrounded itself with a thin egg-shaped cocoon of a yellowish white color, through which the movements of the enclosed grub could be seen. On the morning of the 24th the cocoon was finished and was dense and firm. It was of a reddish-brown color in the middle, blackish-brown at each end. The perfect insect emerged on September 13th, 1881, and proved to be *Ophion purgatus* Say. *Mamestra picta* is a well known insect, and is treated of by Harris, Riley, Lintner and others, but I do not remember seeing any account of its being attacked by a parasite.

THE PARASITISM OF EUPELMUS ALLYNII, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

The fact that this species is a parasite in its larval state does not seem to be questioned, but that it is a parasite on one or more species of *Isosoma* is, I understand, doubted by some entomologists. For the past two years the writer has had no doubt that such was the case; but it is possible the evidence upon which such a conclusion is based may not be generally known. For this reason a brief summary of observations may not be out of place.

That it is a parasite on *Isosoma hordei* seems evident from the following: A single joint of rye containing several galls formed by *Isosoma hordei* was put into a bottle and corked up so that no insects could get out or in. In due course of time a specimen of *E. Allynii* was found in the bottle, and the hole from which it had gnawed its way out of one of the galls was plainly to be seen. Afterward the other galls gave forth *I. hordei*. In this case there could be no question but that the specimen of *E. Allynii* came from the gall made by *I. hordei*. If no *hordei* had hatched from the other galls, this would have been evident, for the galls made by this species are too characteristic to be mistaken by any one at all familiar with their work.

I have bred quite a number of this species from the inside of the stems of wheat; and in all cases they came from the cavities inside the stalk that had been gnawed by *Isosoma tritici*. Though this species of *Isosoma* makes no gall, its manner of eating the tissue around the inside cavity is rather characteristic, so much so as to be readily recognised after

a little observation. I have found a species of grass worked in by another species of an allied insect, but the manner of work is so different as to be unmistakable. *Isosoma elymi* makes a cavity on the inside of *Elymus Canadensis* that is more nearly like that made by *I. tritici* in the wheat, but they differ somewhat.

In the fields I have found specimens of *E. Allynii* emerged from the pupa skin, but still inside the cavity of the stem; others with the hole by which they expected to emerge gnawed so that they could almost get out, and they still there with the body partly protruding, and others when they had gone, the clean cut hole indicating where they had obtained their freedom. I have bred many specimens from the straws after they had been collected, and the conditions were the same as those in the field, the inside of the stems in all cases being examined before putting them into the breeding jar.

From these facts I do not see how I could avoid the conclusion that *Eupelmus Allynii* was a parasite on the two species of *Isosoma*. I may say that my breeding jar in the case of such small insects is a jelly dish, where there is no chance for anything outside to get in.

GALERUCA XANTHOMELAENA, SCHRANK.

BY FREDERICK CLARKSON, NEW YORK CITY.

I visited Flushing, L. I., July 8th, to examine the insect reported to be infesting the noble old English elms which adorn the principal streets of that village. Three weeks ago these trees were in luxuriant foliage; they have now the appearance as if they had been scorched by fire. I discovered them to be attacked with a countless host of the larvae of this beetle. The American elm and other indigenous trees have thus far escaped, but it is not improbable, as this beetle is double brooded, that the numerous larvae will from the force of circumstance attack them. The eggs are laid in clusters along the veins of the leaves, on their under sides. The larvae, as soon as hatched out, begin to devour the leaves, which they render lace-like, and when full fed they do not undergo transformation by fastening themselves to the surface of the leaves, as is the habit with other species, and as I have seen recorded of this, but transform within the crevices of the bark. At this time, July 8th, the trunks of the trees are covered with the larvae seeking places to transform, and there is

scarcely a crevice of the bark but what is filled with the yellow pupal forms which will in a few days disclose the imagines. The ground immediately surrounding the base of the trees is covered with the pupae, which have been dislodged from their positions in the bark by the eager efforts of larvae crowding in the crevices to undergo transformation. As this change occurs within the crevices of the bark of trunk and limb, it becomes impossible, unless at great labor, to apply means for exterminating the pest. The evil, however, is likely to cure itself, for the larvae are so numerous, and such insatiate feeders, that starvation will probably end the visitation. Much good, however, can be done by brushing down the trunks of the trees, sweeping the ground immediately beneath, and destroying the entire mass by fire.

FURTHER REMARKS UPON THE VARIATION OF THE ELYTRAL MARKINGS IN *CICINDELA SEX-GUTTATA*.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

Having been away from home the greater part of the summer, I regret that I have not been able to collect some of these beautiful beetles this season, so as to further observe the interesting relation between the varieties in number, as I should like to have done. I hope, however, that some one has made observations upon them, and will favor us with an account, which would, no doubt, be very acceptable to those interested in the genus.

Since contributing the first notes upon this subject, I have noticed that Say has described two varieties of *C. sex-guttata* in his monograph of the genus *Cicindela*, commencing on page 415, vol. ii., of the American Entomology, edited by LeConte. The first is

"Var. *a*. Elytra each with an additional spot, which is fulvous or white, and generally inconspicuous, placed behind the middle triangularly with respect to the two anterior, marginal ones."

This additional spot is the one I have called the fourth, and var. *a* of Say therefore includes the second and third varieties given in my table (CAN. ENT. xv., 208), as the description says that this fourth spot is "generally inconspicuous," implying that in occasional specimens it is conspicuous; in the second variety of my table this spot being rudimentary, while in the third it is well developed. This phrase also implies

at the same time that the specimens with the additional spot inconspicuous were of much more frequent occurrence than the others, thus proving that Say also found the second the most numerous form, as I have shown to be the case out of forty-nine specimens taken last summer, in the table just referred to. That it was more numerous than his second variety, now to be given, we shall see to be evident, as the latter was probably described from one specimen, the form being very rare.

"Var. *b*. Each elytron with a single marginal spot, the two posterior ones wanting."

This description coincides exactly with that of the two-spotted specimen taken by Mr. Harrington (whose words upon this variety I have already quoted, CAN. ENT., xv., 207). I notice that Mr. Harrington very kindly records having since found that his specimen, believed to be only two-spotted, has also rudiments of the posterior spots (CAN. ENT. xv., 239), which, however, makes it none the less interesting a form. It is not impossible that Say may have overlooked the very rudimentary dots which his var. *b* perhaps possessed, since in many cases they are perfectly indistinguishable without a glass, unless the elytra be opened and held up to the light. Though his specimen may not have had the rudiments of the same spots as Mr. Harrington's possesses, still, from the markings at once discernible upon both, the two may without impropriety be said to be the same. Speaking further of this variety, Say tells us that it was brought by Mr. Thomas Nuttall from the banks of the Missouri, above the confluence of the Platte, the region which produced many of his species of *Cicindela*. Thus we find that the present form has occurred in two distinct and widely separated localities: near Ottawa, Ont. (Mr. W. H. Harrington, latter part of May, 1881, CAN. ENT. xiv., 8) in the great St. Lawrence Basin; and many years before that up the banks of the Missouri, which river constitutes the western portion of the great Mississippi System. We may notice also that in each case the locality of occurrence was situated upon the opposite side from that upon which the other great river system bordered, and at about the centre of farthest removal from it. This proves without a doubt that the variations are wide-spread.

But we have yet another early record upon the subject. In Harris' Entomological Correspondence there is a letter in which Hentz wrote to Harris the following from Northampton, Jan. 1, 1826:—

"*Cicindela sexguttata* I have frequently observed, and have many accidental varieties. The color varies from a deep blue to a bright green.

I have several with the additional spot which you mention; but if you examine your specimens with care you will, I think, discern that mark, or a faint trace, in most of them."

It seems that Harris had previously called the attention of Hentz to an additional spot (probably the fourth) in this species, the above being his reply. Thus was this same variation in the elytral markings observed nearly sixty years ago by Hentz and Harris; the former leaving us to infer from his last sentence that *he also* found the variety with the rudimental fourth spot of the most frequent occurrence. Hentz also observed, as others, myself included, have done, that the ground color of the specimens varies from the typical bright green to a deep blue.

One word more as to the same peculiarity of which our subject treats having been observed in foreign species. Wood gives us some interesting information in his *Insects at Home*, page 16, upon the variation of the elytral markings in *C. campestris* of England. He says:—

"The color of this beautiful beetle is gold-green above, and shining copper-green below; and there are several yellowish spots on the elytra, varying much in shape, number and hue. Sometimes there are only three, but in many specimens there are six. In former times the variety in the number of spots was thought to indicate that the beetles belonged to different species, but it is now decisively ascertained that they are only varieties of one single species."

Many other species of *Cicindela* are known to vary considerably in their elytral markings and coloration, some much more than others. *Cicindela* is indeed a variable genus.

NOTES ON CHRYSOMELA.

BY GEO. H. HORN, M. D.

Chrysomela scalaris Lec. The question asked by Dr. Hagen in the June number concerning the name of this insect, is more easy to answer than to arrive at a definite conclusion. Stal, in his monograph, did not recognise many of the genera into which *Chrysomela* had been divided; among them were *Doryphora* and *Leptinotarsa*. Finding that Olivier in 1807 had described a *D. scalaris*, and that Maj. LeConte in 1824 a *Chrys. scalaris*, Stal superseded the latter name by *multiguttis*. Recent authors are in accord in adopting many of the genera rejected by Stal.

and the name originally given our species becomes valid and has been adopted by Jacoby (Biol. Cent. Am., vi, pt. i., p. 197, pl. xi., fig. 6). That the name should remain in future *Calligrapha scalaris* is fortunate, since we have lately received from Arizona a specimen of *Calligrapha multiguttata* Stal (in cab. Lec.), which is well figured in the work above cited, pl. x., fig. 5.

Calligrapha opifera Stal. To this species I refer some specimens collected by Morrison in Arizona. They differ from the figure given by Jacoby (Biol. loc. cit., pl. 12, fig. 10) in having the elytral markings narrower, so that the sigmoid band does not unite with the sutural stripe. In all other respects there seems to be no difference; the markings are of the same type and occupy the same relative position.

Calligrapha labyrinthica Lec. Under this name specimens have been distributed in many cabinets, based on a name long existing in Dr. LeConte's cabinet, and which has never been published. The markings so exactly reproduce those of *C. pumila* Stal (Biol. loc. cit., pl. 11, fig. 18) that I have no hesitation in referring our specimens to that species. My specimens are from Canada. I have no memorandum of the locality of those in LeConte's cabinet.

Calligrapha limbaticollis Stal, should be omitted from our lists. The species was added by Crotch on the authority of several specimens marked "Chicago" in the cabinet of Dr. LeConte. On inquiry by me concerning these specimens, Dr. LeConte told me that the source from which he obtained them had proven very unreliable in other cases, and he advocated removing the above name from our lists.

Doryphora (Leptinotarsa) melanothorax Stal. A specimen collected by Prof. Snow in New Mexico is in LeConte's cabinet, and has been identified by the latter with this species. It is of the form and size of *Haldemani*, etc., head and thorax black with a slight tinge of green, the elytra vittate nearly as in *decemlineata*.

Plagioderia fuscilosa Stal. A specimen of this species is in my cabinet from California. Body oval, not very convex, beneath aeneopiceous. Head piceous, front testaceous. Antennae with the five basal joints testaceous, the outer joints black. Thorax sparsely finely punctate, piceous, the apex and sides testaceous. Elytra coarsely sparsely punctate without order, yellowish, suture black, except a short distance at base, a median transverse black band, sinuous on its margins and wider exter-

nally, an oval humeral black spot, a smaller one within, a large triangular black spot, which is emarginate in front, near apex.

This species is well figured in Biol. Cent. Am., vol. vi., pt. 1, pl. x., fig. 1, with the name *aeneiventris* by mistake.

LIST OF GEOMETRIDÆ CAPTURED AT ORONO, MAINE,
AND VICINITY.

BY MRS. C. H. FERNALD.

Choroedus clemitaria, A. & S.	Metrocampa margaritata, Linn.
" transversata, Drury.	Antepione deontanata, Gr. Rare.
Tetracis crocallata, Guen.	" sulphurata, Pack. Very
" lorata, Grote.	rare.
Metanema quercivoraria, Guen.	Sicya macularia, Harr.
Very rare.	Hesperumia ochreatea, Pack. Rare.
" inatormaria, Guen.	Angeronia crocataria, Fab.
Rare.	Nematocampa filamentaria, Guen.
" carnaria, Pack.	Plagodis rosaria, G. & R. Very
Caberodes confusaria, Hübn.	rare.
" majoraria, Guen. Rare.	" keutzingaria, Gr. Very
Ennomos alniaria, Linn.	rare.
Eudalimia subsignaria, Hübn.	" fervidaria, H.-S. Very
Azelina hubnerata, Guen.	rare.
Endropia serrata, Drury.	Hyperetis amicaria, H.-S.
" obtusaria, Hübn. Rare.	Aplodes packardaria, Gr.
" effectaria, Walk.	Nemoria subcroceata, Walk.
" bilinearia, Pack.	" gratata, Walk.
" armataria, H.-S.	Eucrostis chloroleucaria, Guen.
" vinulentaria, G. & R.	Ephyra pendulinaria, Guen.
Very rare.	Acidalia inductata, Guen.
" marginata, Minot.	" quadrilineata, Pack.
" warneri, Harvey.	" enucleata, Guen.
" hypocharia, H.-S.	Asthenia lucata, Guen. Rare.
" duaria, Guen.	Stegania pustularia, Guen.
Fpirranthis obfirmaria, Hübn.	Gueneria basiata, Walk. Rare.
Therina fervidaria, Hübn.	Deilinia variolaria, Guen.

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| <i>Deilinia erythemaria</i> , Guen. | <i>Paraphia subatomaria</i> , Guen. Rare. |
| <i>Eudeilinia herminata</i> , Guen. | <i>Biston ursarius</i> , Walk. 1 ex. |
| <i>Corycia vestaliata</i> , Guen. | <i>Eubyja cognataria</i> , Guen. |
| " <i>semiclarata</i> , Walk. | " <i>quernaria</i> , A. & S. 1 ex. |
| <i>Eumacaria brunnearia</i> , Pack. | <i>Hybernia tiliaria</i> , Harris. |
| <i>Semiothisa bisignata</i> , Walk. | <i>Anisopteryx autumnata</i> , Pack. |
| " <i>enotata</i> , Guen. | <i>Operophtera boreata</i> , Hübn. |
| " <i>granitata</i> , Guen. | <i>Heterophelps triguttaria</i> , H.-S. |
| <i>Phasiane orillata</i> , Walk. Rare. | <i>Baptria albovittata</i> , Guen. |
| " <i>mellistrigata</i> , Gr. | <i>Lobophora geminata</i> , Gr. Very rare. |
| " <i>trifasciata</i> , Pack. | " <i>vernata</i> , Pack. |
| <i>Thamnonoma wavaria</i> , Linn. | " <i>montanata</i> , Pack. |
| " <i>sulphuraria</i> , Pack. Rare. | <i>Triphosa indubitata</i> , Gr. |
| " <i>brunneata</i> , Thun. Rare. | <i>Hydria undulata</i> , Linn. |
| " <i>argillacearia</i> , Pack. | <i>Phibalapteryx intestinata</i> , Guen. |
| <i>Lozogramma lactispargata</i> , Walk. | <i>Anticlea vasaliata</i> , Guen. |
| " <i>detersata</i> , Guen. | <i>Rheumaptera ruficillata</i> , Guen. |
| " <i>atropunctata</i> , Pack. Rare. | " <i>fluctuata</i> , Linn. Rare. |
| " <i>defluata</i> , Walk. | " <i>lacustrata</i> , Guen. |
| <i>Eufitchia ribearia</i> , Fitch. | " <i>unangulata</i> , Haw. Rare. |
| <i>Orthofidonia exornata</i> , Walk. Rare. | " <i>lugubrata</i> , Schiff. |
| <i>Caripeta divisata</i> , Walk. Rare. | " <i>hastata</i> , Linn. |
| " <i>angustiorata</i> , Walk. 1 ex. | <i>Ochyria ferrugata</i> , Linn. |
| <i>Ematurga faxonii</i> , Minot. | " <i>designata</i> , Hübn. |
| <i>Fidonia truncataria</i> , Walk. | <i>Petrophora diversilineata</i> , Hübn. |
| " <i>notataria</i> , Walk. | " <i>testata</i> , Linn. |
| <i>Caterva catenaria</i> , Drury. | " <i>prunata</i> , Linn. Rare. |
| <i>Cleora pulchraria</i> , Minot. | " <i>albolineata</i> , Pack. |
| <i>Cymatophora larvaria</i> , Guen. Rare. | " <i>hersiliata</i> , Guen. |
| " <i>humaria</i> , Guen. Rare. | " <i>truncata</i> , Hufn. |
| " <i>pampinaria</i> , Guen. | <i>Hydriomena trifasciata</i> , Borkh. |
| " <i>crepuscularia</i> , Tr. | <i>Epipirita perlineata</i> , Pack. Rare. |
| <i>Tephrosia canadaria</i> , Guen. | <i>Plemyria fluviata</i> , Hübn. |
| " <i>cognataria</i> , Hübn. | " <i>multiferata</i> , Walk. Rare. |
| " <i>anticaria</i> , Walk. | <i>Glaucopteryx cumatilis</i> , G. & R. |
| | <i>Eupithecia miserulata</i> , Grote. |
| | " two undescribed species. |

ATTACUS CINCTUS, TEPPER.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

A friend of mine—Mr. R. J. Mendenhall, of Minneapolis, Minn.—while travelling in Mexico last winter, collected from a tree, supposed to be the wild olive, a number of the cocoons of some large Bombycid. On his return home he kindly gave these cocoons into my keeping, with the information that he could easily have collected hundreds had he had conveniences for carrying them, as the trees on which they were found had been ruinously defoliated by the insect in its larval state. The cocoons were about the size and somewhat resembled those of *Telea polyphemus*, but were rather more elongate and were not intermixed with the chalky substance seen on the surface of the latter. They depended from the twigs by bands or cords of silk from five to seven inches long.

When I received them, about the last of March, several of the moths had already attempted to make their escape, but owing to close packing had died in the act, and all that I could determine was that the colors were similar to those of *ccropia*. The cocoons that were yet intact were placed in a large rearing cage and sprayed with water, and on the 4th of April I had the pleasure of beholding for the first time a perfect specimen of the striking and beautiful species named above. Every entomologist will understand my delight as I examined its rich coloring, the large, triangular mica-like plates with which the wings were ornamented, and the band of bright colors laterally encircling the abdomen.

In the course of the following two weeks fourteen or fifteen perfect specimens emerged, as well as some that were imperfect. They exhibited considerable variety in shade. In the majority the general color tone was a rich brown inclining to olive, others were suffused with red, while a few were of a cold gray tint.

There were more males than females, and quite singularly, the former were in nearly all cases larger than the latter. Desirous of seeing the larvæ, I used every device of which I could think to obtain fertile eggs, but without success. Many eggs were scattered about on the sides of the cage and on twigs of cherry, plum and apple to which the moths were confined, but none of them hatched. I also liberated all crippled or injured specimens on various trees where I could in a measure keep guard over them, but they refused to adapt themselves to their new environment and perished without progeny.

As soon as the first specimens were dry, I sent examples to Prof. Riley, who determined them as *Atiacus cinctus* Tepper, first described and figured in the "Bulletin of the Brooklyn Entomological Society for January, 1883."

One fact in connection with these specimens struck me as singular, viz., that not one of my thirty or more pupæ were parasitized. With us so large a proportion of Bombycid pupæ, under natural conditions, are destroyed by *Ichneumonidæ* and by *Chalcis* and *Tachina* flies, that I confidently expected to get something new in this line also.

Mr. Tepper's types were collected in Southern Arizona, but he does not tell us the species of tree on which they were found. Neither was Mr. Mendenhall quite certain that he had been correctly informed concerning the Mexican tree from which he made *his* collection. Consequently the food plants and larval history of this magnificent species still remain to be investigated by some entomological explorer in southern latitudes.

CITHERONIA REGALIS, HUBNER.

BY FREDERICK CLARKSON, NEW YORK CITY.

In a late number of this journal, Mr. Hamilton makes some criticisms upon an article contributed by me to the January number, having reference to the transformations of this moth. That article was prepared having regard, as a matter of course, to the climate of this locality, and as the specimens referred to were developed in the one season, the question of variation of temperature was not under consideration. That the transformation of the pupa can be furthered or delayed by atmospheric conditions, is well established; a warm room developing the imago at an earlier period than natural, and an ice-house holding it in check over one season, to be developed when restored to the climatic influence of another. My point was, from facts ascertained by rearing in confinement, with surroundings as near natural as possible, that the period of pupation, whether early or late, did not create an earlier or later development of the imago, which commonly occurred at the end of May. The history of the transformation of this moth under natural conditions, would be more satisfactory than that which results from rearing in confinement, and I regret that my town residence in winter denies me this study. That extraordinary

seasons further or hinder the advent of insects, is undoubtedly true, but as a general rule their time-table is quite as exact as the migratory birds.

I think it may be problematical as to whether the pupa remains beneath or upon the surface of the ground during the winter. My experiments, after having made the most natural provision at hand, have resulted in the pupa appearing upon or near the surface, and I would add that I find by my records that a larva obtained the previous season to that mentioned in the article already referred to, transformed in the same manner, the moth appearing on the 28th of May. My theory, in the absence of more essential data, is that the pupa of this moth, in its natural state, seeks the surface and finds security under the winter leaves. I have read with much pleasure what Mr. Hamilton writes with regard to this question, but it seems to me that the only satisfactory test, other than natural, would be in the use of soil common to the growth of the hickory, as that which is the most likely habitat of this species at this period of its history, giving to the pupa when thus conditioned the full service of all climatic changes. The provision as recommended by Mr. Hamilton is somewhat in agreement with what I have stated. He writes: "Take two parts of sandy loam, such as is used by plasterers, and one part of black friable soil from the woods, mix together * * and when the larva disappears cover over with a layer of moss, and then the pupa will not come to the surface." This effectually imprisons the pupa, and it becomes a matter of curious enquiry if the larva, in order to transform, could have selected a spot similarly conditioned.

ON TROGODERMA ORNATA, PHYSONOTA UNIPUNCTATA
AND TANYSPHYRUS LEMNÆ.

BY JOHN HAMILTON, ALLEGHENY, PA.

Trogoderma ornata. Since the publication of the remarks in vol. 15, p. 91, more has been learned concerning this pest. That it disclosed without entering the earth was eventually made evident by several of the beetles being found in a large, close box, just emerging. Why they should disclose in a large box and not in a small one was not very obvious. At last the thought occurred that hygrometric differences in food and atmosphere might account for it. Having some of the larvæ reared in a small wooden pill box, at the usual time for pupation some of these were placed

in another box of the same size, and their food moistened. In a few days they were found to have pupated, the beetles emerging about ten days thereafter. Their companions left unmoistened in the other box never developed. This is sufficient demonstration. Their entering the ground to pupate is exceptional, and the inference that they do so normally is erroneous.

Anthrenus varius is quite innocent when compared with this pest, the larva usually staying where the parent deposits the egg. But it is quite otherwise with our *T. ornata*. The female oviposits wherever she finds a dead fly, moth, or other insect; and when the young, after hatching, have devoured this, they travel off in every direction, gliding into boxes through the minutest crevice, often effecting an entrance with their jaws. Last summer a couple of small exchange boxes containing a few beetles were wrapped in four thicknesses of paper and stowed away. Later, the paper was found to be riddled with minute holes and these larvæ were in possession. An effectual mode to keep them out of boxes is to fold some crystalized white naphthaline in a paper and pin it in each box, renewing it yearly. This preventive is reliable. I have some boxes made of Red Cedar, in which there are open seams, but no museum pest ever enters them. The introduction of this insect into my premises has been traced to a lot of moths, crickets, etc., sent me from West Chester, in Eastern Pennsylvania, and last year it had so increased as to give great annoyance. Having observed its habits as above, I applied vigorous treatment early this season, which I am satisfied has resulted in its absolute annihilation. As a knowledge of the method may be of advantage to some unfortunate entomologist, the outlines are given. About the first of April I saturated some two inches of the borders of the carpets around my rooms with a solution of corrosive sublimate in alcohol—two drachms to the pint. Then, in the corners and out-of-the-way places, powder and pill boxes were placed containing dead flies, moths, and small insects. The beetles oviposited in these, avoiding altogether such as occurred on the carpet along the walls. About the first of June it was considered safe to remove the traps and consign the whole to the flames. In connection with this, all refuse material in boxes, etc., not insect proof, was destroyed, and places that alcohol would not injure received a brushing with the solution. Result—not a single larva has been observed this season.

Physonota unipunctata Say. Three years ago, in the month of July, I found a colony of these beetles on the river bank feeding on *Monarda*

fistulosa L., taking over fifty individuals. They almost wholly stripped the mint of its leaves. A few of the larvæ were feeding with them—a curious object indeed; bright yellow, its body depressed, oblong oval, with serrate spinose margins and a long bifurcate caudex turned over its back, reaching nearly to its head. I regret a more minute description can not be given, as I neglected to take any of them at that time, and none could be found when again sought for. This species had not previously been observed here and has not been since. The whole colony was no doubt the progeny of one beetle transported from some more northern region by the Allegheny during the annual spring inundation. They were all taken on a patch of mint not two rods square, none occurring on neighboring patches. With age the elytra become too hardened to pin in the usual way. All taken were of Say's type—namely, pale above with one black spot on the thorax. Mr. Randall, in the Boston Jour. Nat. Hist., vol. 2, p. 30, describes a variety (*Cassida helianthi*) with three black spots on the thorax and with the elytra in life “blackish, irregularly spotted with white,” which he found on a species of *Helianthus*. Messrs. Walsh & Riley describe another variety (*Cassida 5-punctata*) found in Northern Illinois, the food plant of which has also been discovered to be a *Helianthus*. Mr. Say mentions still another variety occurring in Mexico of a smaller size and with a transverse, arcuated, black line on the thorax behind the abbreviated one.

Thus it appears that the species as a whole is very variable as to color ornamentation. It would be interesting to learn whether the races breed true to their types, or whether like *Anomala undulata* Mels., color variations occur in the same brood. And further, whether each race has a food plant of its own. Perhaps some of your readers living where the species occurs frequently could give the desired information.

The colony that was found here must have fed on the *Monarda* of choice rather than of necessity, because three species of *Helianthus* (*decapetalus* L., *giganteus* L., *divaricatus* L.) grew with it and were not eaten by either larvæ or beetle.

Mr. Riley in his Second Annual Report on the Insects of Missouri, p. 59, gives a wood cut of a larva of *Ph. 5-punctata* W. & R., distended, classifying it with the me[r]digerous larvæ. The ones I saw must have been nearly mature and were all clean, their furcate tails turned forward over their backs and not loaded with stercoraceous matter and cast skins,

however it may have been with them when younger and in greater need of protection.

Tanysphyrus lemnae Fab. This is a very small thing, being among the minutest of Rhyncophora, about .05 inch in length, though this does not detract from its interest. Its trivial name is derived from the plant on which it feeds, *Lemna (minor)*, Duckweed, the little plant that floats on stagnant waters in the summer, mantling them with green, and like the insect, common to Europe and America. Though exceedingly abundant, it does not seem to be generally known, appearing on few catalogues. It occurs in August and September, and its presence may be known by observing the little circular hole it has eaten through the centre of the Lemna frond. They stay beneath the leaf as it lies on the water, or liquid mud, and come to the upper surface when this is agitated. Such as emerge from clear water are entirely black, but those from the mud appear mottled; the dorsum of the thorax and elytra from which the mud is wiped as they come forth between the contiguous edges of the fronds, is black, while the other parts are more or less gray from the dried mud. No other Rhyncophorus insect being found on this plant, this alone will suffice for its identification when found. It has very long legs, and unlike most Curculionides, the insect in death does not fold them under its body, but spreads them out on either side.

LIST OF DIPTERA TAKEN IN THE VICINITY OF
MONTREAL, P. Q.

BY F. B. CAULFEILD.

Determined by Dr. S. W. Williston.

BIBIONIDÆ.

Bibio albipennis, Say. Common, end of May and beginning of June.

TIPULIDÆ.

**Bittacomorpha clavipes*, Fabr. Several specimens taken in a damp meadow, June.

XYLOPHAGIDÆ.

Xylophagus rufipes, Loew. Not common, June 7, 1877.

CŒNOMYIDÆ.

Cœnomyia ferruginea, Meig., *pallida* Say. Not rare on parts of Montreal Mountain, June, 1883. I found them sitting on ferns in open

places. I did not observe them in the more heavily wooded portions.

STRATIOMYIDÆ.

Stratiomyia obesa, Loew. Not rare, on flowers.

TABANIDÆ.

Chrysops callidus, O. Sacken. Not uncommon in woods.

" *fugax*, O. Sacken. Common.

Theriopectes socius, O. Sacken. Rare, one ♂ taken on blossoms of an umbelliferous plant, July.

" *septentrionalis*? Loew.

" *lasiophthalmus*, Macq. May 19, 1877.

Tabanus catenatus, Walk. Rare, one specimen taken resting on a stone by the river side, Lachine, July 15, 1877.

LEPTIDÆ.

Leptis punctipennis, Say.

ASILIDÆ.

Dasyllis flavicollis, Say.

" *thoracica*, Fab. Not common, open woods, July.

Laphria bilineata, Walk. Rare.

" *gilva*, Wilstn. Rare.

BOMBILIDÆ.

Anthrax alternata, Say.

" *fulviana*, Say.

" *sinuosa*, Wied.

Bombylius fratellus, Wied. Common on the border of a birch wood, Hochelaga, May 6, 1877.

THEREVIDÆ.

Thereva candidata, Loew.

SCENOPINIDÆ.

Scenopinus fenestralis, Linn.

SYRPHIDÆ.

Chrysotoxum ventricosum, Loew. Rare.

Syrphus ribesii, Linn. Common.

Sphaerophoria cylindrica, Say.

Xanthogramma flavipes, Loew.

Rhingia nasica, Say. Not uncommon.

Volucella evecata, Walk. Not rare.

Sericomyia chrysotoxoides, Macq. Rare.

" *militaris*, Walk. Not common.

Eristalis Bastardi, Macq. Not uncommon.

" *tenax*, Linn. Common.

" *transversus*, Wied. Common.

" *brousi*, Wilstn. Common.

Helophilus similis, Macq.

Syritta pipiens, Linn. Common.

Somula decora, Macq. Rare.

Chrysochlamys dives, O. Sacken. Not common.

Spilomyia fusca, Loew. Not common, on umbelliferous flowers, July.

" *quadrifasciata*, Say. Common on blossoms of *Solidago*, Aug.

Temnostoma aequalis, Loew. Rare.

Sphecomyia vittata, Wied. Rare.

CONOPIDÆ.

Conops furcillatus, Wilstn. Rare.

Zodion fulvifrons, Say.

TACHINIDÆ.

Hystericia vivida, Harris. Common.

MUSCIDÆ.

**Musca domestica*, Linn. Abundant.

CORDYLURIDÆ.

Scatophaga stercoraria, Linn. Common.

SCIOMYZIDÆ.

Tetanocera pictipes, Loew.

" *plebeja*, Loew.

ORTALIDÆ.

Pyrgota undata, Wied. Not rare.

Ceroxys similis, Loew.

Seoptera vibrans, Linn. Rare, one specimen taken.

Chaetopsis aenea, Wied. Rare.

TRYPETIDÆ.

Straussia longipennis, Wied. Not uncommon.

Tephritis albiceps, Loew.

PIOPHILIDÆ.

**Piophilina casei*, Linn. Common, bred from cheese.

DROSOPHILIDÆ.

**Drosophila ampelophila*, Loew. Common.

With the exception of those marked with an *, all the species in the above list were submitted to Dr. Williston, who kindly named them. As

I only took such Diptera as chanced to come in my way while collecting Coleoptera and Lepidoptera, the list is a very incomplete one. But as it contains some species not on the Society's List, I thought it better to give it, imperfect as it is, rather than wait until further collections would enable me to extend it.

NORTH AMERICAN TORTRICIDÆ, BY LORD WALSLINGHAM,
M. A., F. L. S., &c.

BY C. H. FERNALD, STATE COLLEGE, ORONO, MAINE.

The above is the title of a very interesting paper which his Lordship had the kindness to send to me, and which was published in the Transactions of the Entomological Society of London for April, 1884.

This paper of 27 pages and one colored plate contains descriptions of 24 new species and one new genus (*Pseudoconchylis*), with copious notes on others. These insects were collected by Mr. H. K. Morrison in Mexico, Arizona, Montana, Wisconsin, North Carolina and Florida, and the paper is also of value in giving the distribution of many well known species.

His Lordship calls attention to the fact that *Conchylis bimaculana* Robs. is distinct from Hübner's *Pharmacis sartana*, although placed as a synonym in my Catalogue of the Tortricidæ. I had already reached the same conclusion from material which I received from Florida, but had not published the fact.

The generic names *Bactra* and *Aphelia* are both used, inadvertently, without doubt, for I have already shown (Ent. Month. Mag. vol. 20, p. 126) that they are synonymous and only one can be used.

Lord W. speaks in his introductory remarks as follows: "The great dividing range of the Rocky Mountains exercises, as might have been expected, a very important influence upon the Micro-Lepidoptera of North America, forming a barrier over which these delicate insects are apparently unable to pass. The proportion of eastern species found on the western side of this barrier is remarkably small, although the same genera are for the most part represented more or less abundantly in both parts of the continent."

While these remarks are certainly true, it is a noticeable fact that quite a number of species have actually distributed themselves all over the country and occupy the territory on both sides of the great mountain

ranges, but they are all species, so far as I know, which are quite polyphagous, or such as have been distributed through the agency of man.

This paper, together with others which his Lordship has previously published, has done much to advance our knowledge of the North American Micro-Lepidoptera, and we sincerely hope that he may continue his very valuable work.

CORRESPONDENCE.

Dear Sir: Hickory, walnut and sweet gum have generally been given as the food plants of *Citheronia regalis*, but I have a caterpillar nearly ready to pupate which has been raised on sumach (*Rhus copallina*). I offered it *Rhus glabra*, but it only nibbled the edges of a few leaves and finally abandoned feeding until the other species was restored. A friend, to whom I communicated these facts, also found a caterpillar of *regalis* on *R. copallina*.

WM. T. DAVIS, Tompkinsville, Staten Island, N. Y.

COCOONS ON LILAC.

Dear Sir: It would be interesting to know if the cocoons noticed on lilac by Mr. Couper were really those of *Hyperchiria io*. I always thought that the larva of *io* left its food plant when full grown and spun its cocoon beneath old leaves and rubbish on the surface of the ground. Might not *Callasamia promethea* have been the species observed by Mr. Couper?

F. B. CAULFIELD, Montreal.

Dear Sir: In glancing through the June number (just received) of the ever welcome ENTOMOLOGIST, I notice that Mr. J. Alston Moffat speaks of a specimen of *Callosamia angulifera* taken at Ridgeway, Ont., as being two sizes larger than a specimen from New York. To me this expression is meaningless. I should be glad if Mr. Moffat would give us the measurement in inches.

H. H. LYMAN, Montreal.