

The Canadian Entomologist.

VOL. XXXIX.

LONDON, APRIL, 1907.

No. 4.

HABITS OF SOME MANITOBA "TIGER BEETLES" (*CICINDELA*).

BY NORMAN CRIDDLE, AWEME, MANITOBA.

This paper is the result of two years' study and a number of years' collecting in the neighbourhood of Aweme, Manitoba. It has no pretence of being complete in all details or of taking in all the forms inhabiting the Province, a very small portion of which has yet been collected over. The species and varieties mentioned, with the exception of *hirticollis* and *pusilla*, have been under personal observation, and all have been collected within twelve miles of Aweme, which is in latitude 49°, 42'; the height above the sea averaging about 1,180 feet.

In working up the habits of these insects I have received much valuable information through the generous assistance of Prof. Wickham, to whom my grateful thanks are due. I am also under deep obligation to Mr. E. D. Harris for supplying me with much information.

The species are arranged according to Dr. W. Horn's Index.

In habits, the Manitoba, and probably all the North American species, could be divided into two groups; namely, those which hatch out in August, or thereabouts, and hibernate, and those species, such as *lepida*, which appear from pupæ towards the end of June and die before winter sets in.

This somewhat interesting difference in habit has not, so far as I am aware, received any marked attention, though I am inclined to believe that it has been a factor of some importance in the modification of a number of species.

The individuals of the first of these groups, at the approach of winter, search out a suitable situation and excavate a hole in which they pass the winter. The depth of burrow varies considerably with the different species, and even to a marked extent in forms that are classed as subspecies. The choice of a locality for hibernation varies according to the species, but all seem to prefer a situation in which there is a slant facing the south, so that they get full advantage of the sun. In investigating the methods of hibernation I have found that a shallow hole dug in the

vicinity of a *Cicindela* locality always proves productive, and that large numbers will congregate from all parts to seek their winter homes in such places. The hole, however, should be dug a month or more before the hibernating season commences.

In digging, the beetles loosen the earth with their mandibles, and use one leg at a time when kicking the earth back. For the first three to eight inches the hole is dug at an angle, after which it usually goes down in an almost perpendicular direction, though it often happens that when starting after an interval of rest the beetles will take a slightly different direction, so that the hole is never straight, but turns first one way and then another. For the first six to fifteen inches the earth is thrown out, but after this depth is reached the hole is gradually filled in moderately tightly. From four to ten inches being left unfilled at the bottom to enable the beetle to work its way out.

The hole is nearly always wide enough at all points to allow the beetle to turn round, and is always so at the bottom. When the hole is completed, the beetle turns round and faces the top, ready for digging its way out the next spring, when it emerges in practically as perfect condition as when it went in.

A few species, and these closely related, probably dig below the usual frost line, but many do not, as I have dug out several kinds that were in the solid frozen ground and were quite motionless, and which took fully half an hour to become even moderately active in a warm place. All the hibernating forms become sluggish, and eventually torpid as the earth gets cold and frozen.

There are, no doubt, many belonging to this group that never leave their winter homes, especially those kinds that inhabit localities close to water. In fact, it is by no means an uncommon occurrence to find dead specimens of the previous year when digging out live ones. Hundreds were found hibernating in 1906 only five feet above low-water mark in the banks of the Assiniboine River, which the rise of the water in the spring would almost surely totally destroy.

The second of our groups contains strictly summer species, which do not pass the winter in the imago stage, but only as larvæ, possibly as pupæ or ova. There are, however, in the United States some species that are probably intermediate between the two groups, which either pass the winter in very shallow holes or under stones, fallen trees, etc., but these, though difficult to distinguish from the summer species, strictly belong to our first group.

In no case can I find any evidence to warrant the belief that any of our native forms are double-brooded, and it seems highly probable that the same could be said of all North American Cicindelidæ. From my investigations I was inclined to think that no specimens emerged from pupæ in the springtime, but Mr. E. D. Harris writes that he has collected specimens in the early spring that "bear unmistakable evidence of very recent emergence from the pupa condition," and he suggests that these are belated specimens which failed to appear at the usual time in the early autumn.

I can give little information as to the habits of the larvæ. Most of, and probably all, the Manitoba Cicindelas pass one winter as larvæ, and indications point in some cases to two winters being passed in this condition. Unfortunately, I am unable to write with exactitude in this matter, but think it well to draw attention to the subject.

The larvæ are by no means the helpless creatures out of their holes some writers think. They can crawl readily, and, undoubtedly, in some cases leave one hole and dig another. At the approach of winter they commence deepening their holes, and, like those of the beetles, when completed the holes vary in depth with the different species. In digging, the insects loosen the earth with the mandibles, and then shove that flat shovel-like structure of the head and prothorax under the loosened earth until sufficient has been received to make a load, when the insect turns round and works its way up, holding the "shovel" in a horizontal position until it gets level with the top of the hole, when the head and "shovel" is suddenly jerked backwards, which throws the earth two or three inches away. Larvæ that were watched took from 70 to 113 seconds between each load of earth when the holes were about 14 inches deep.

The plates of the head and prothorax form a most interesting structure, which has apparently been specially modified for the purpose of digging and carrying earth to the surface.

For the first portion of the season most of the work is done at night or in the evening and early morning, but as the season advances digging is also done in the daytime, especially if the weather is cold. Usually larvæ are found digging a week or more later in the season than the imagoes. As the holes get deeper the sand becomes gradually piled up so that the insects are unable to throw it so far away, and at last the earth, by rolling back, blocks the entrance, though not, I believe, until the correct depth has been attained, as in some cases the hole is built up

through the loose sand. When finished the hole is usually blocked near the top, and in some cases further down, after which the larva retires to the bottom for the winter.

To a beginner the holes are much like those made by a burrowing-spider, for which they usually pass. They can, however, be at once distinguished from these by the absence of web at the entrance, and nearly always by the formation of the heaps of sand thrown out. Those of spiders are nearly always in a complete circle, while those of *Cicindela* larvæ are either in one heap or in two opposite each other.

The larvæ are always enormously abundant in comparison with the beetles, which shows that large numbers must perish, though by what means I am unable to say.

The beetles are sometimes destroyed in large numbers by badgers.

The habits of each species, sub-species or aberration follow under separate headings

Cicindela formosa, aber. *Manitoba*, Leng.—The largest of our Manitoba tiger-beetles. This form is not very well differentiated from *generosa*, and I have specimens of both before me that I am only able to separate with difficulty, though with the average specimen *Manitoba* is easily distinguished by the broadness of the elytral markings, which in some cases cover nearly two-thirds of the elytra. Some specimens also run rather closely to *formosa* in colour and markings. In newly-hatched specimens the anterior portion of the elytra is sparsely clothed with fine hairs.

These handsome beetles are strong fliers. They usually inhabit the edges of sandy blow-outs where the vegetation is straggling and far between. The new brood appears about the second week in August, and is overlapped by the old brood to the extent of about ten days.

Manitoba is among the earlier kinds to commence winter quarters, choosing much the same locality as *limbata*, but in places rather more sheltered. For depth of hole this form stands out alone. The average depth of burrow from the entrance is 38 inches, in soft sand the depth is about 44 inches. The deepest hole measured was 47 inches, and the shallowest 25. Larvæ holes that probably belonged to this form were from 30 to 48 inches deep. They were in rather denser vegetation than where the beetles are usually found, but were close to blow-outs inhabited by *Manitoba*.

Manitoba has been noted feeding upon *Disonycha quinquevittata*, and upon other *Crysolimelidae*, as well as upon ants.

Cicindela venusta, Lec.—Dry sandy fields and small blow-outs in which there is some vegetation are the favourite habitations of *venusta*. This species is sometimes found in company with *Manitoba* in *Manitoba* localities, but *Manitoba* is seldom found in the favourite hunting-ground of *venusta*. *Venusta* is a strong flier, though not quite as strong as *Manitoba*. It is among our most common species, and is found throughout the season. The old brood begins to disappear about the middle of July, and the new appears early in August. The old brood overlaps the new to a small extent. Small open places with a slope facing south are the spots most frequently selected for hibernation; burrows are also found among vegetation on the edges of drifting sand. The average depth of 49 specimens dug out was $19\frac{1}{2}$ inches, the deepest 32 inches and the shallowest 12 inches. In soft sand about 22 inches is the average depth.

I believe the larvæ hibernate at greater depth than the beetles, but exact data are lacking owing to the similarity of some of the species.

Cicindela limbata, Say.—One of the most abundant of our tiger-beetles, abounds on large sandy blow-outs where the vegetation is scanty. It is sometimes found on very small patches of drifting soil, but is always much more plentiful on white sand that is constantly drifting. After high winds they are sometimes found in large numbers in hollows or among grass on the opposite side from which the wind has been blowing. They are found copulating from early in June to quite late in July, often partly buried in the sand. Towards the end of July a great many die off, but some remain in activity until after the new brood has made its appearance during the first and second week of August, specimens of the old brood being at once recognized by the hardness of the elytra, which are also often partly discoloured in old specimens, while in the new they are soft, and make poor cabinet specimens for two weeks or more after they appear, but in this they differ little from other species.

Towards the end of August a few begin to dig out their winter homes, especially on small blow-outs where the ground is dark. By the tenth of September most of the specimens are at work in the above localities, but on white sand they remain tolerably numerous until the last of the month. In 1906 all had disappeared by the 6th of October.

The places chosen for hibernation are at the edges of blow-outs, though, as a rule, in the soft sand. Slopes that are facing the sun at mid-day are much preferred. The holes average 11 inches from the entrance. The deepest measured was 17 inches, and the shallowest 7 inches.

Limbata is one of the first species to make its appearance in the spring. They have been found in sunny spots on the 3rd of April. Doubtless their early appearance is due to the shallowness of their burrows and the warmth of the sand when exposed to the sun.

The larvæ pass the winter in holes of about the same depth as the beetles. They can, however, stand much more cold, and remain active for nearly a month later. In 1906 the last was found digging on the 26th of October, at a time when the ground was frozen to an inch in depth and the temperature was below freezing. A larva dug out on the 24th of October dug to a depth of $4\frac{1}{2}$ inches in 18 hours, with probably large intervals of rest. Larvæ are often found in the middle of blow-outs, though they prefer to dig near grass or weeds.

Cicindela purpurea, sub-sp., *limbalis*, Klug.—In summer inhabits damp ground. The hills of pocket-gophers (*Geomyide*) in meadows are favourite haunts. It is also found in company with *repanda* on wet roadways, and with *12-guttata* on the banks of rivers. Copulation takes place in May. This insect is nowhere common, and is nearly always found singly or in pairs. About the middle of September they seek out a somewhat drier spot than their usual summer hunting-ground in which to pass the winter, and they are then found in many odd places. Edges of sandy blow-outs, stubble fields, sand pits, dry roadways and clay banks are among the places where they have been discovered. In sand the depth of hole is about 16 inches, in clay it is 6 inches, and on the edge of roadways where the ground was hard and rooty two specimens were found hibernating only 3 inches below the surface, while in sand the deepest hole was 19 inches.

Limbalis is rather a late form to appear in the spring. The beetles first emerge from pupæ in August.

Cicindela duodecimguttata, Dej.—An abundant species along river banks wherever there is mud or wet sand. They differ from *repanda* in preferring localities close to running streams, often going right to the water's edge in search of food. The form collected at Aweme has much the same markings as *repanda*, excepting that they are narrower and do not extend as much at the margin, some also have the markings broken more like the typical form.

I am indebted to Prof. Wickham for the determination of this species.

The winter homes of *12-guttata* are usually close to their summer ones, being dug into the river banks where there are open spots, from

four to twelve feet from the level of the river. With these species that dig into banks of streams the holes are usually somewhat on the slant. One hundred and forty-eight specimens were dug out, and their holes measured. In sandy soil these averaged 16 inches, deepest 20 inches, shallowest 10 inches. In clay or gravel the average depth was 7 inches, deepest 10 and shallowest 2 inches.

Two or three specimens were often found in the same hole, and 50 or more might be dug out within the space of a square yard. *12-guttata* is the latest of the Aweme tiger-beetles to hibernate, specimens in 1906 being still numerous on the 14th of October, and a few were found quite active, just commencing to excavate burrows, as late as the 20th of October, after heavy frosts.

Larva holes are usually very numerous all up the river banks near where the adults hibernate. The holes generally slant obliquely into the banks. They average in depth from 6 to 15 inches, but in summer time they are often only 4 or 5 inches deep. Both larvæ and imagoes must often perish in their winter homes when the water rises above them.

C. 12-guttata, sub-sp., *repanda*, Dej.—Common along muddy roadways and wet fields. I have found it in abundance along furrows and in wet spots in tall grain, and also on sand in wet localities, and in lesser numbers on rather muddy spots along river banks.

Repanda appears in the spring with *12-guttata*, rather later than the other forms, probably owing to their habit of usually hibernating in cold, damp ground, which takes longer to warm up. The old brood overlaps the new to the extent of about ten days. The new brood begins to appear late in July and during the beginning of August. They are one of the later tigers to hibernate, and owing to their inhabiting wet spots they have often to seek winter quarters some distance away. They have been found hibernating fully half a mile from their summer hunting-grounds, and, no doubt, in some cases go much farther. Hillsides or banks with little vegetation are usually chosen as winter quarters. In sandy localities *repanda* digs to an average depth of 19 inches, the deepest hole examined being 22 inches, shallowest 18. In clay the depth of hole is often only 6 or 8 inches, but when found in company with *12-guttata* their holes average from 2 to 4 inches deeper than that species. Both *12-guttata* and *tranquebarica* have been found in the same hole as *repanda* while hibernating.

Cicindela hirticollis, Say.—A single specimen has been collected at Aweme, which was confused with other species at the time. Unfortunately, no data are available as to habits or time of capture. From its appearance, however, I am convinced that it hibernates. Prof. Wickham says of this species: "Has much the same habits as *repanda*, but is less commonly found in the interior."*

Cicindela tranquebarica, Herbst.—Found on open spots in almost all localities in small numbers. Dry land and wet land, sand, mud or alkali seem to be alike suitable to its tastes. I have found this species hibernating in clay within five feet of the water of a river, and also in dryish sand fully a hundred feet above the water level, with no water in the vicinity. Roadways, stubble fields, muddy flats and pure sand blow-outs are where it is found most plentiful, but it is always where the vegetation is very scanty. It has been found in company with all the forms mentioned in this paper, and in the same hole as *12-guttata* and *limbalis* while hibernating. It has also been found hibernating near all the other hibernating kind. The average depth of the winter hole in sandy land is 18 inches, deepest 24 inches, shallowest 11 inches. In clay it averages 8½ inches, deepest 12, shallowest 6 inches.

This species appears from pupa during the middle and latter part of August. In the spring it appears from its winter home with *venusta* as soon as the ground thaws out. It is one of the late species to hibernate.

Ants, small beetles, aphides and cutworms are among its food.

The form found in Manitoba is broadly marked, and has, until recently, been known as *obliquata*.

C. longilabris, aber. *Montana*, Lec.—Black or bronze above, with only a slight indenture to show where the middle band has been. In some this band is partly visible.

Montana inhabits bare spots on dark and dryish land; roadways are seemingly preferred. It has also been taken on ploughed fields, but nowhere plentifully. Unfortunately, I have been unable to secure this form in its winter home, though it undoubtedly hibernates. The new brood makes its appearance towards the end of July and beginning of August. This form when disturbed usually flies into the grass, and is then easily captured.

C. obscura, aber. *Lecontei*, Hald.—This form in Manitoba usually has the markings all united so as to form a white margin. The colour varies from bright green to an iridescent-wine colour.

*Habits of American *Cicindelidae*, p. 220.

Lecontei is found in dry situations. Sandy fields or the edges of drifting sand among sparse vegetation are its favourite spots. It is found in company with *Manitoba*, *venusta* and *tranquebarica*, but nowhere commonly. The new brood appears in August, and they begin to excavate their winter quarters early in September, being one of the first tiger-beetles to disappear. The burrows are nearly always made in very small openings, not more than a foot or so wide, surrounded by weeds, etc., being the least open locality of any of our forms or species, with the possible exception of *Montana*. The average depth of hole of a number measured, from the entrance, was 16 inches, the deepest being 22 inches and shallowest 10 inches. The beetles appear again in the spring in April, at about the same time as *venusta*, and disappear late in July, about a week before the new brood appears. This form has been seen feeding upon cutworms.

C. punctulata, Oliv.—A summer species. Appears late in June and dies off towards the end of August. At Aweme it is found on old trails and on prairie where the grass is thin. Appears to be confined to a few spots, where it is usually plentiful.

The larvæ were found in holes on the prairie in small mossy places between clumps of grass in dry situations, at an average depth of 21 inches, the deepest hole being 26 inches and the shallowest 18 inches. Most of the holes at this date (Oct. 7) were filled up tightly near the top, and again about four inches lower down, so that it was very difficult to push a grass-stalk down them. As with other species, the larvæ greatly exceed the beetles in numbers.

C. pusilla, Say.—This species is taken by Mr. L. E. Marmont, of Rounthwaite, which is only about 12 miles from Aweme. It occurs on roads and bare spots where the land is of a very black colour. Mr. Marmont takes *pusilla* in July and August. One he collected as late as the 24th of August. No sign of the beetles could be found in June, and this fact, combined with the general appearance of the insect, leads me to the conclusion that it is probably a summer species that dies at the approach of winter.

Pusilla has also been taken by Mr. A. W. Hanham at Bird's Hill, near Winnipeg. Mr. Hanham says, from his experience, *pusilla* never flies, but runs very rapidly, "easily disappearing off the trail into the long grass and so away." He adds that he only took two or three at the most. Mr. Marmont on one occasion caught a specimen in a pail of milk.

The species varies in colour from dull green to black. There is also considerable variation in markings, some specimens being almost immaculate.

C. lepida, Dej.—Only found on drifting sand planes, on sand, which they very closely resemble in colour. This is the weakest flier of any Manitoba tiger-beetle that I have collected, and towards the end of their season, at about the time when eggs are being deposited, the females make no attempt to fly, but are obliged to trust entirely to their running powers as a means of escape. They are usually found on the sunny side of a drifting sand-bank, where they get blown by the wind.

Lepida appears late in June, and is most numerous in July. It disappears towards the end of August. I have only once found it at all plentiful.

NOTES AND DESCRIPTIONS OF MEMBRACIDÆ.

BY C. F. BAKER, ESTACION AGRONOMICA, SANTIAGO DE LAS VEGAS, CUBA.

CENTROTIDÆ.

Gerridius abbreviatus, n. sp.

Length, 4.5 mm., male. General form and colour of *G. scutellatus*, but differing widely in the following characters: Legs mostly piceous; the scutellar protuberance directed somewhat forward instead of backward; marks of tegmina arranged in the same pattern, but the oblique band at the middle of tegmina very broad and heavy, being three times as broad at middle of tegmina as at tip of clavus; tegmina with apical margin entirely fuscous, the larger spot at outer tip much broader than long. The most distinctive character lies in the form of the tegmina, which are much shorter than in *G. scutellatus*, the middle apical cell being two-thirds the length of the second discoidal cell, the same cell in *G. scutellatus* not being one-half of second discoidal.

I collected this interesting species at San Marcos, an Indian pueblo well up in the western coast range of Nicaragua.

Ischnocentrus niger, Stal.

The small dark males and the larger paler females (originally described as *I. ferruginosus*, Stal.) I found not uncommon at San Marcos, Grenada, and Chinandega in Nicaragua, these points all being far north of the records given in Biol. Cent. Amer.

SMILIIDÆ.

Cyrtolobus Vanduzei, Godg.

This species was formerly described by Goding under the genus *Smilia*, a genus noted especially for the great elevation of the pronotum

over the lateral angles. But the present species has the form not of *Smilia*, but of *Cyrtolobus*. These two genera cannot be separated by the presence or absence of a cross-vein between the two ulnar veins, since this cross-vein is frequently absent in *Cyrtolobus*, and is commonly present or represented by rudiments in *Smilia*; indeed, numerous specimens in both genera may be found that are *Cyrtolobus* on one side and *Smilia* on the other, and this is a common condition in the species under discussion. However, *Cyrtolobus* rarely has the pronotum at all elevated so far forward as above the lateral angles.

Telamonanthe Rileyi, Godg.

During all the days of collecting I was able to crowd into a busy three years on the West Coast, I was continually looking for the two species of *Telamona* described by Goding as *Rileyi* and *Coquillettii*. Though I collected some *Telamona* related to the *reclivata* of Fitch, still there were no *Telamona* that possessed the characters of these species. I had, however, taken a series of specimens in Middle and Southern California, and received others from Oregon, of a species certainly as variable as any *Telamona*, but belonging in another group of the family. It possessed a petioled apical cell in the wings, and had, besides, the tegminal venation nearly, and also the very strongly produced shoulders of *Antianthe*. Its pronotal hump was more like that of certain *Telamona* than *Antianthe*, not being quite so evenly rounded in front, and rather deeply depressed behind. In two other important particulars it differs widely from *Antianthe*: the radial nervure is distant from the costa and quite close to the outer ulnar, leaving a broad costal area; almost the whole area bounded by the costa and the inner ulnar, except at extreme apex just before the apical areas, is thick coriaceous and strongly punctate throughout.

I had separated this as a new genus and species, and was about to describe it when, through the kindness of Dr. Howard and Mr. Heide-man, I was able to study authentic specimens of Goding's *Telamona Rileyi* and *T. Coquillettii*. In these specimens I found the very species with which I had been working, both representing merely such forms as I possessed a number of within the same species limits, and such as might be found in considerable numbers in almost any eastern species of *Cyrtolobus* and *Telamona*. Goding was evidently misled by the general form and failed to examine the wing venation, or he would never have referred it to *Telamona*. I had named it *Telamonanthe*, and it may bear that name, with *Rileyi* as the type and *Coquillettii* as a synonym.

In the darker forms (the darkest from Oregon) there is a broad brown band with lighter margins, sometimes entirely involving the protuberance, and extending downward and backward to the margin of the pronotum. The anterior extremity of the brown mark, medially, where the protuberance slopes down in front to the level of the pronotum, persists as a characteristic brownish mark even in the palest southern forms, and is present as usual in both of the forms named by Goding.

Micrutalis, sp.

This genus might almost be called the dominant group of the superfamily in Central America and the West Indies, as it is also in the Southern United States. But it is also widely distributed in the United States and Canada. One has only to collect considerable series in any species—say *calva*, which is common in the United States—to discover that like some other membracids (*Telamona* or *Cyrtolobus*, for instance) these species possess a remarkable range of colour variation. Even *Clastoptera proteus* with all its forms is not more protean than some of these species of *Micrutalis*. But I cannot find in the literature that any account has been taken of these marvellous variations, nor have I seen heretofore sufficiently large series in collections to properly illustrate them. Many of the *Micrutalis* "species" of literature have been described from one or a few specimens, whereas but very few of the names represent more than the merest colour forms, as large series clearly prove. For instance, I have now before me from the Southern States, Mexico, Central America and the West Indies, a series of one hundred and seventy-two specimens, which evidently belong to the one specific group, *binaria*, of Fairmaire, some from Belize representing the typical form.

But in the lot there are scarcely two exactly alike, and the gradations extend in various directions. For some of these names can be found, like *mutabilis*, Fowler; *discalis*, Walker; *pallens*, Fowler; *lugubrina*, Stal; *Illinoiensis*, Goding; *apicalis*, Goding; *trifurcata*, Goding; *occidentalis*, Goding; *parva*, Goding; and *binotata*, Goding. All of these are based on the merest colour characters. But we would need twice again as many names to designate the other forms which are equally distinct, and all of which present the same range of form, size and structural characters as the original *binaria*. The relation of this species to *calva*, which appears to be generally larger and longer, and the variability of *calva*, are matters to be investigated by the many collectors living within the range of *calva*. Part, at any rate, of the South American species of Stal are the merest colour forms, and the relation of all of them to *binaria* and more northern

forms must be established by the collection of large series, before a stable nomenclature for the group as a whole can be even suggested. For instance, the *plagiata* of Stal and the *malleifera* of Fowler apparently belong to the same specific group, being very close, structurally. *Malleifera* as it occurs in Nicaragua, Mexico and Belize, is extremely variable. The species of true *Acutalis* are also remarkably variable and equally worthy of collection and investigation.

DARNIDÆ.

Darnoides flavescens, n. sp.

Length, about 4.5 mm. This is a pale yellowish-brown species with an evenly-rounded, not at all raised pronotum, which is evenly, coarsely punctate, and its acute point tipped with black. The sternum is blackened. The tip of pronotum reaches the end of clavus. The tegmina are glassy hyaline, the nervures are pale at base to dark at tip; at extreme base of clavus, and of corium between ulnar vein and costa, the substance of the tegmina is coriaceous and strongly punctate, the puncturing extending outward some distance along the veins. The claval nervure is not half the length of the clavus. The terminal veins are nearly straight except the second from costal margin, which is distally bent towards the costa. There is a single large discoidal cell formed by a cross-vein between inner and outer ulnar veins before the middle of tegmina.

This species was collected in Belize, British Honduras, by a former student of mine, Mr. J. D. Johnston.

Darnoides semicrema, n. sp.

There occurs not uncommonly in the vicinity of Havana, a small membracid which bears a remarkable resemblance to *Acutalis semicrema*, and possibly may be found in some collections under that name. It is, however, shorter and more robust, and differs wholly in its family and genus characters. I cannot find that it has been described. Even if I make a synonym, however, I trust that it will be a readily recognizable one. It is sometimes necessary to make a synonym in order to properly elucidate and bring to light some of the ancient and illy-defined species which would otherwise remain merely stumbling blocks in our literature.

Length, 4.5 mm.; width across pronotum, 2.25 mm. Legs, sternum and abdomen of varying shades of shining piceous, lighter on dorsum and on tibiae and tarsi. The abdominal segments are narrowly margined with paler. The sternum anteriorly and a large spot on sides of metathorax are more or less white waxy pruinose, the latter spot showing through the costal base of tegmina. The head is very short and broad, the vertex

entirely black to near the front margin of eyes, its surface sparsely and microscopically wrinkled and punctured; the remainder of the head is yellow. The ocelli are slightly farther from each other than from the eyes. The genal margins join the clypeus on either side almost in one straight line. The clypeus extends abruptly, evenly rounded, about as long as wide.

The pronotum on anterior half is black, the posterior half and the sides extending to shoulders are yellow. Over each eye is a large triangular piceous blotch. The pronotum in front is nearly smooth, posteriorly dark punctate. Viewed from the side the upper margin of posterior half is nearly straight, the lower margin between shoulder and tip is trisinate, the median sinus stronger, and between this and the margin a submarginal pitted groove. The tip of pronotum reaches nearly to end of first inner apical cell.

The claval nervure is more than half the length of clavus. There are three discoidal cells, due to a forking of the outer anteapical nervure and a cross-vein between the two ulnars. The basal cell is small and triangular, and scarcely half the length of the anteapical cell beyond it. The two outer terminal nervures are slightly curved towards the costa. The tegmina are somewhat smoky, the nervures dark distally to nearly colourless at the base. The claval suture and commissural margin are blackened at the extreme base. The corium at base is only punctured along the nervures, while one-fourth of the clavus is coriaceous and punctate. The central apical cell of wings is long and narrow, the sides subparallel and the base truncate.

MOSQUITO NOTES FOR 1906.

It has been customary in the past to speak of mosquito larvæ or wrigglers as dependent on atmospheric air, and to assert that they would drown if shut off from the surface for more than a few minutes. When it was discovered that some wrigglers with well-developed air-tubes were really aquatic, and rarely came to the surface at all until ready to pupate, it was necessary to modify that statement and to admit of numerous exceptions. Yet the statement is still a serviceable one when applied to the more troublesome species, and forms the basis upon which we

recommend oiling stagnant pools to destroy mosquito life. Even where it is generally true, however, mosquito larvæ may, under exceptional conditions, survive complete submergence for some time.

Late in the fall of 1905 (November) Mr. H. H. Brehme was collecting on the salt marshes under instructions to investigate ice-covered pools, and on that day the pools generally had an ice coating one-quarter of an inch or more thick. It was necessary to break through this cover to make collections, and among other things a number of larvæ of *Culex salinarius* were found, apparently dead and lying on the bottom. Put into a bottle of water they sank and remained there for a time. After a few minutes signs of life were observed and feeble movements were noted. Then came a few jerks and a feeble effort to reach the surface. After a short period of quiescence came another attempt, and yet another, until finally the surface was reached, and communication with the outer air was re-established. Again the larvæ descended, remained below a few minutes, reascended, and in about an hour the creatures were as lively as ever. They had been cut off from the air for 12 hours at least, had not been caught in the freezing ice, but had apparently become torpid and sunk to the bottom. With the rise in temperature activity was renewed, and in the laboratory the specimens were nearly all brought to maturity.

November 30, 1906, Mr. Brehme was again collecting on the marshes, and in pools covered with thin ice formed during the preceding night, he took a number of full-grown larvæ and two pupæ of *Culex cantator*. The larvæ were scarce, only two or three to a pool, but all were active and developed normally. It is quite possible, therefore, that in a mild season like that of 1906, a salt-marsh brood might issue as late as December 1st, and, indeed, a communication received from Dr. Howard leads me to believe that locally such a brood did issue in a neighbouring State. If that was also the case in New Jersey it was not noticed, and the insects did not get off the marsh.

We have also been in the habit of considering the adult mosquitoes as rather short-lived, and this turns out to be another error, as to quite a number of species at least. A striking case noticed in 1906 was that of *Culex abfitchii*, which until that year was known from New Jersey by only a specimen or two as the result of three or four years of close collecting. In April of last year the larva was found locally in the Orange Mountains

in great numbers, and in early May the adult was the common woods mosquito, a fierce and persistent biter within its domain, from which it did not venture. Week after week these adults continued on, and not until late July did they decrease materially in numbers. The last captures were August 16, and as all the brood was out of the pools early in May, these specimens had lived well over three months, and the bulk of the brood had lived close to or quite three months. The possibility of a second brood is absolutely excluded, because the local conditions were kept under constant observation during the entire period. We begin to hope that even in 1907 we may yet learn something new concerning these interesting creatures. JOHN B. SMITH, New Brunswick, N. J.

TO COLLECTORS OF NOCTUIDS.

Sir George Hampson is now working at the Acronyctinæ for his "Catalogue of the Lepidoptera Phalenæ in the British Museum." He writes that this group includes all the genera he has not yet dealt with in Dyar's Catalogue down to page 197. He is very badly off for Canadian species, especially from Eastern Canada, in the genera *Apatela*, *Hadena*, *Papipema*, *Caradrina*, etc., and large series of as many species as possible will just now be of great assistance to him. I therefore make an appeal to Canadian entomologists to help in this great work, and will gladly receive and forward free of all expense any specimens which Canadian collectors may be willing to send either as donations to the British Museum or as a loan for study. I shall be glad if those having duplicates for exchange in this genus will correspond with me. The above Catalogue is of special use to Lepidopterists of the whole world, and as we now know that Canadian specimens will be acceptable, I have little doubt that many Canadians will help in building up the collections in the British Museum, which is a safe depository for insects, and where every facility for study is given to students from all parts of the world. Good specimens of all Noctuids, particularly from Eastern Canada, will also be acceptable, but at the present time the Acronyctinæ are most desired. Letters and parcels of specimens can be sent to me free of postage if addressed officially.

JAMES FLETCHER, Entomologist and Botanist.

Central Experimental Farm, Ottawa.

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 84.)

Hysterosia Merrickana, Kearf.—I desire to limit the type of this species, *ante* page 59, to the specimens from New Brighton, Pa., consisting of four males and two females, the former expanding 24–26 mm. and the latter 26–28 mm. I have two examples from Montclair, which seem to be identical with those from New Brighton, but there is sufficient variation in the specimens from the other localities to warrant separating them, at least for the present, or until longer series or breeding may prove them to be merely local races or distinct species.

Until recently I have identified all of the ochreous-gray and ochreous-brown specimens, having the characteristic dark oblique line from the inner fourth to dorsal margin, and a paler basal area before it, as *H. inopiana*, Haw.; but the accumulation of over one hundred specimens from many different localities makes it possible to separate them into a number of apparently different forms. The following may be added now, and later it may be thought advisable to characterize eight or ten additional forms which seem to be different:

Hysterosia komonana, sp. nov.

Head and palpi grayish-white, latter lightly shaded with brown outside, antenna gray, basal joint ochreous brown; thorax whitish-fawn; abdomen light yellowish-gray, segments 6 and 7 light fuscous, anal tuft whitish-fawn; legs whitish-fawn, dusted and banded with bronzy-brown.

Fore wing: Fold brown; an ochreous-brown shade from inner fifth of dorsum turns under costa at middle, without reaching it; before this shade the basal area is whitish-fawn; beyond the shade the whitish-fawn ground colour is strigulated with light brown. A darker dot at end of cell in middle of wing. The dark strigulations are somewhat closer together in apical end of wing, but not sufficient to form the dark apical patch that is so characteristic of this genus. Cilia concolorous, but shining.

Hind wing yellowish-gray, reticulated with light brown, cilia paler, with a darker line near base; under side the same. Under side fore wing light ochreous-brown.

Expanse, 22–26 mm.

Nine specimens: Alma, Santa Clara Co., California, J. G. Grundel; Stockton, Utah, Tom Spalding.

April, 1907

Hysterosia waracana, sp. nov.

Head, palpi and thorax cream-fawn, palpi darker on outside; antenna leaden-brown; abdomen yellowish-white, fuscous on two segments before anal segment, with whitish lateral tufts, anal tuft ochreous; legs whitish, dusted and banded with brown.

Fore wing very pale yellowish-fawn, with only a suggestion of a paler oblique basal line. Cilia the same.

Hind wing purplish-gray, not strigulated, cilia white, divided near base by a fuscous darker line; under side the same, but very faintly strigulated. Under side fore wing ochreous with a purplish tinge, lighter along costa.

The females are darker than the males, fore wing ochreous-fawn; hind wing darker purplish-gray.

Expanse, 15-19 mm.

Two male and six female specimens: Regina, Assa., July 15, collected by Dr. James Fletcher; Prince Albert, T. N. Willing.

Hysterosia riscana, sp. nov.

Head light yellowish-brown; palpi cream-white inside and upper edge, fuscous brown outside and outer ends; antenna yellowish-gray; thorax light yellowish-brown, sides of tuft fuscous-brown, posterior end of tuft whitish; abdomen grayish-fuscous, anal tuft pale ochreous; legs ochreous-white, dusted and banded with dark fuscous-brown.

Fore wing gray, heavily irrorated with bronzy-black. There is an oblique narrow white streak from dorsum near base to upper end of cell, about inner third; before this streak the dark scales are lessened, causing a gray shade, beyond it they are increased, resulting in a darker shade. The apical area, from outer fourth of costa to anal angle, is darker than the rest of wing; before it is a narrow fascia paler than the area before it; this fascia broadens out on dorsal margin, with a spot of whitish scales on anal angle, with a few black dots on its outer edge. Cilia bronzy-gray.

Hind wing bronzy-gray, strigulated with darker vertical lines, cilia whitish-gray, with a narrow light basal line, beyond which is a broader dark line; under side very light brownish-white, with strigulations much stronger than upper side. Under side fore wing smoky-bronzy fuscous, paler on costa, with a dark spot at end of each vein, the one at vein 10 the largest and darkest.

Expanse, 14-19 mm.

Three specimens: Essex Co., Park, New Jersey, Light Trap, July 2; Glenburn, Pa., July 10 and 20, A. E. Lister.

This is allied to *H. Merrickana*, K. It can be separated by the edge defining the dark apical area, which in *Merrickana* is straight, and in *riscana* at upper third turns, goes to costa vertically, making a hump at that point.

Hysterosia tiscana, sp. nov.

Expanse, ♂ 15-18 mm, ♀ 17-19 mm.

Head grayish-ochreous; palpi grayish-white inside, bronzy-black outside; antenna brownish-fuscous, middle of thorax and patagia bright ochreous-brown, edged on side with blackish-brown, the posterior tips of the scales whitish; abdomen grayish-fuscous, anal tuft cinereous; legs whitish, banded and dusted with bronzy-black.

Fore wing mottled shades of gray, fuscous and bronzy-black. The oblique line from dorsum at inner fourth is almost obsolete, being a more intense blackish shade on the dark ground colour; it is, however, sharply outlined on basal side by streak of whitish, mixed with a few ochreous scales. There are three black lines in the apical fourth, beginning on costa and coming nearly together at tornus. These lines are edged with ochreous, and vertical ochreous strigulae cross the wing, especially on the lower half, between these lines and the base. At the end of cell is an angulated cluster of black scales, margined with white, and between it and the inner of the three black lines is a parallel short black line in middle of wing. Between the middle black line and termen the ground colour is whitish-gray. Terminal line black, cut by three dashes from as many small white spots in tornus. Cilia gray.

Hind wing-pale gray, cilia the same, with a darker basal line; under side gray, heavily reticulated with bronzy-brown. Under side fore wing smoky-black, spotted with dull ochreous on costa, terminal line black, preceded by a dull ochreous line. The females are much darker, thorax and fore wing almost uniform bronzy-black, without any paler markings.

Five males and four females, Essex County Park, N. J., Aug 1-22; Light trap.

Hysterosia Cartwrightana, sp. nov.

Expanse, 18-24 mm.

Head and thorax light brownish-ochreous; palpi whitish inside, light brownish-ochreous outside, shaded anteriorly with bronzy-brown; antenna brownish-fuscous; abdomen ochreous-fuscous; legs whitish, banded and dusted with bronzy black.

Fore wing light ochreous-brown, shaded with yellowish-fawn below the fold, and with grayish on the outer half of wing. The dark shades and line are bronzy-black. The dorsal oblique shade from inner fourth is distinct, and ends in a horizontal dark dash in middle of cell. The basal shade before it is whitish. Beyond the middle the costa is marked with four dull ochreous spots and a fifth in apex; from between each of these irregular lines of blackish scales cross the wing. From the end of the cell a dark shade extends to the termen, beginning as a point in the middle of wing, and increasing in width until at termen it extends from apex nearly to dorsum. The space above and below it is by contrast paler. Cilia ochreous-gray, cut between each two veins by a lighter streak.

Hind wing grayish-white to fuscous-gray, cilia paler, preceded by a darker line; under side ochreous-gray, heavily reticulated with dark brown. Under side fore wing smoky-brown, costa dotted with dull ochreous.

Six specimens, Cartwright, Manitoba, E. Firmstone Heath.

Hysterosia Pecosana, sp. nov.

Expanse, 20-25 mm.

Head and palpi ochreous-brown, latter paler inside; antenna grayish-fuscous; abdomen ochreous-brown, anal tuft whitish; legs whitish, banded with bronzy-black.

Fore wing almost uniformly light ochreous-brown. There is a whitish shade before the dark oblique shade from inner fourth of dorsum; the dark shade is only conspicuous at its upper end, where it forms a dark spot in the middle of the wing; there is a similar dark brown spot at end of cell; beyond which are some dark vertical strigulations. Cilia whitish-ochreous.

Hind wing ochreous-gray, cilia paler, with a darker basal line; under side the same, very faintly strigulated with a darker shade. Under side fore wing smoky-brown.

Three specimens, South-west Colorado, July 26, W. G. Dietz; Beulah, New Mexico, July, Cockerell; Pecos, New Mexico, at light, Aug. 16, Cockerell.

The description is from the Colorado specimen. The one from New Mexico is more distinctly marked on costa with blackish dots, and below fold with blackish strigulations.

Carposina Ottawana, sp. nov.

Expanse, 16-17 mm.

Head dark gray, whitish in front; palpi whitish inside, ochreous, dotted with bronzy-brown outside; antenna bronzy-gray; thorax bronzy-gray, posterior end whitish-gray; abdomen dark shining fuscous above, anal tuft dull ochreous; legs whitish, dusted and banded with bronzy-brown.

Fore wing shades of gray and fuscous. There is a whitish-gray basal patch, extending in middle of wing to inner third, with a small bronzy-brown spot on dorsum at base, and another above it in middle of wing extending to costa. The costal edge is slightly darker gray, and is marked with six large bronzy-brown spots between inner third and apex. At the end of cell there are two spots, vertical to each other, of dark brown raised scales, shaded with whitish outwardly. In the fold beyond middle of wing is a short blackish line, above which is a cluster of grayish raised scales, edged outwardly with white. Below the fold, on inner third, is a small blackish dot. There are a few black dots on the outer fourth of wing, below the costal spots, and an irregular line of black dots before termen. Cilia dark, speckled gray.

Hind wing smoky-gray, cilia same but shining; under side paler. Under side fore wing dark smoky gray.

One ♂ and two ♀ specimens, Ottawa, Canada, June 20, C. H. Young.

The fore wings of this species are narrow, but less pointed than *crescentella*, Wlsm.; it resembles *crescentella*, but is generally darker, and the crescent-shaped row of black spots with the white character before them are entirely wanting.

Proteopteryx momonana, sp. nov.

Expanse, 13.5-15 mm.

Head ochreous-gray; palpi cinereous brown outside and in front, inside dirty white; antenna ochreous-brown; thorax grayish-brown; patagia ochreous-brown; abdomen fuscous above, silvery-white below and on sides; legs whitish, dusted and banded with dark brown.

Fore wing dark bronzy-brown, somewhat overlaid with grayish-blue on the inner half, shading into ochreous-brown in the outer half; the ochreous shade is brighter in the apex. There is a conspicuous pure white dorsal spot, between middle and outer fourth; the inner edge is slightly oblique and convex (the dark ground colour is more intense where it touches this spot); it extends to middle of wing, and is slightly angulated at the top; the outer edge is angulated and outwardly oblique; it sends a

spur towards the ocellic spot, and with the ocellic spot encloses a blackish-brown elongated dorsal spot; the latter contains a few whitish scales on dorsum, and the white spot is similarly marked with brown dots. The ocellus is large, the centre is ochreous, crossed by four short black lines; below it is gray, and the vertical side bars are shining gray; at the upper end of the inner bar a gray prominence points toward the outer end of the white dorsal spot. Costa is marked with four black dots, between middle and apex, each outlined by whitish ochreous lines; below costa these lines are leaden-metallic, and proceed horizontally below costa towards termen. Below apex the black terminal line is cut by a white dash, and a similar interruption occurs at the tornus. Cilia leaden-cinereous.

Hind wing whitish-gray at base, shaded with smoky-black outwardly; cilia light gray, with a black basal line; under side grayish-white. Under side fore wing smoky-brown, costal spots repeated.

Eight ♀ specimens, Ottawa, Canada, July 6 to Aug. 8, C. H. Young; Rounthwaite, Manitoba, July, L. E. Marmont.

Fore wing: termen concave between veins 3 and 7, all veins free. Hind wing: 3 and 4 short-stalked, 5 close to base of 4.

Epinotia fortunana, sp. nov.

Expanse, 13-17 mm.

Head whitish-ochreous, face paler; palpi cream-white inside, anterior end and outside darker; antenna pale fawn; thorax dark brown in middle, edged with pale fawn; abdomen dark fuscous; legs cream-white, banded with bronzy-brown.

Fore wing cream-white, with basal area, fascia and spots of black overlaid with ochreous scales. The basal area extends beyond inner fourth on costa, is obliquely outward to middle of wing, then angles slightly inward to dorsum, which it reaches beyond inner third; it contains a streak of cream-white on its inner half on the dorsal margin, which at the outer end sends a white shade above middle of wing; the outer edge touches margin of basal area below the costa, the upper edge of this shade connects with two whitish costal spots; the dark spots, outlined by these white streaks, are ochreous in the middle and outlined with black. There is a cream-white, narrow, angulated fascia in middle of wing, divided by a line of shining pale ochreous. Where the fascia touches costa it is divided by a blackish-brown dash. Beyond the fascia are four large geminate whitish costal spots; the second one is the beginning of an outer angulated fascia, which sends a spur to tornus, and above middle an

inward streak, which connects with a similar outer spur from the middle fascia. The outer costal spot sends a white streak into termen below apex; and just below it a whitish line starts, which parallels termen and connects at the tornus with the spur from the outer fascia. The spots between these whitish bands are black, dusted with ochreous. Terminal line black, cut below apex and in tornus, where the white bands touch these points. Cilia mottled leaden-gray, paler at base.

Hind wing smoky-brown, cilia dark gray, with a darker basal line; under side gray. Under side fore wing dark smoky-brown, costal spots repeated.

Twelve specimens, Ottawa, Canada, June 24 to July 3, C. H. Young.

Enarmonia Fleteherana, sp. nov.

Expanse, 13-15 mm.

Head, palpi and antenna cream-white; thorax cream-white, smooth and shining, with an iridescent reflection; abdomen shining fuscous above, cream-white below; legs cream-white, the anterior pair lightly banded with light brown in front.

Fore wing: Inner half of wing, including basal area, cream-white; the basal area is defined by a broken angulated line of black, starting as a short, outwardly oblique dash from inner fifth of costa to upper edge of cell; in middle of cell, about one-third from base, the line begins again, and continues obliquely to inner fourth of dorsum. In the white area the costa is marked with two or three dark dots, and as many on dorsum beyond the dark line. The white area extends to inner two-fifths on costa and to outer third on dorsum; beyond it the outer half of wing is black, thickly mottled with metallic-blue scales. While the division is sharply marked, the edges of the white and dark areas are irregular. In the black area, at the end of cell, is a large patch of blue-metallic scales, some of which edge the white area; there are a few whitish scales in this patch, and through its middle it sends a black line into the white area. The terminal line is black, preceded by an olivaceous-ochreous shade, and the same shade continues below costa, in the dark area, on which are three blackish-brown spots, edged with pale ochreous on inner, the larger spot on costa, marks the beginning of the dark area. From the pale ochreous costal lines the metallic-blue lines begin below the costa, where they touch the termen; they cut the black terminal line with pale ochreous dashes, one below apex, one above tornus, and one in tornus; these ochreous terminal dashes are of the same value as the costal ochreous dashes. All of the

large ocellic area is overlaid with lines of metallic-blue. Cilia grayish-fuscous, shading into pale-ochreous at base and around tornus.

Hind wing light smoky-brown, paler toward base, cilia pale ochreous, preceded by a dark basal line; under side darker, mottled along costa. Under side fore wing dark smoky-brown, costal spots repeated.

Nine specimens, Ottawa, Canada, June 18 to July 3, C. H. Young.

I take a great deal of pleasure in dedicating this most beautiful and distinctive species to my very good friend, Dr. James Fletcher.

Enarmonia prosperana, sp. nov.

Expanse, 13-17 mm.

Head smoky-fuscous; palpi white inside, fuscous outside, apical joint dark fuscous; antenna and thorax dark fuscous; abdomen shining whitish-fuscous, anal tuft dull ochreous; legs whitish, banded and dusted with bronzy-black.

Fore wing: Inner three-fifths cream white, suffused on the basal half with broad grayish-fuscous strigulae, becoming paler outwardly, and disappearing before the termination of the white area, and having an angulated white band in the middle of wing; the costa in this area is fuscous, marked with four or five white dashes. The outer third of wing is fuscous, mottled with lighter scales; it encloses a large ocellic spot of three horizontal black lines, and vertical inner and outer bars of metallic blue; a few metallic dots of the same colour nearly join the lower ends of the bars; between and below these dots are black dots, and a broken line of black is in the basal side of the inner bar, with a short line of black before it, in the edge of the white fascia. The outer half of costa is ochreous-fuscous, and marked with four large geminate white oblique lines, each sending below a line of metallic-blue; that from the inner joins the inner ocellic bar; the metallic lines from the second and fourth geminate dashes join and go into termen below apex, where they interrupt the black terminal line. There is a dot or small cluster of black scales between fold and middle of wing, about two-fifths from base; there are a few black dots below the costa. Cilia leaden-metallic.

Hind wing smoky-brown, paler at base; cilia white, with a darker line close to base, and a finer line between it and outer ends; under side darker and blotched with bronzy-brown, especially below costa on outer half. Under side fore wing bronzy-black, with a grayish reflection, costal spots repeated.

Fifty or more specimens, Wellington, B. C., Taylor and Bryant; Vernon, B. C., Venables; San Luis Obispo, Vachell; etc., etc.

This species is close to *succedana*, Schif., of Europe.

(To be continued.)

MOSQUITO NOTES.—No. 5.—CONTINUED.

BY C. S. LUDLOW, M. SC.,

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In the article describing *Grabhamia nigromaculis** mihi, reference was made to a group of mosquitoes in the north-western part of the U. S., and probably occurring also in Canada, in which the species are closely related and the individuals show great variation, and to which *nigromaculis* belonged. Two more of this group are described below, one of which lies close to *G. Curriei*, Coq., but the distinct, clean-cut abdominal markings and difference in colouring are characteristic; though corresponding to the habit of the group, there is variation among the individuals.

Grabhamia mediolineata, n. sp.—(Female.)

Head dark brown or black, covered with long, curved, pale, almost white scales, a few ochraceous ones; bright brown flat lateral, and slender white forked scales on the occiput, some brown bristles between the eyes and around the eyes; antennæ dark brown, verticels dark brown, pubescence white, first joint testaceous, and in some lights all the joints are apparently light banded, basal joint testaceous, with slender flat white scales on the median surface; palpi black, a few white scales at the tip, and occasionally at the base of penultimate joint; proboscis black and quite long, tip black; clypeus black; eyes black and silver.

Thorax black, prothoracic lobes with long pale ochraceous curved scales (spatulate?); mesonotum covered on the median third with bright brown slender curved scales for about two-thirds its length, the caudad third with slender pale curved scales; immediately laterad of this median stripe is a broad pale stripe of rather broader curved scales, and exterior to this another stripe of brown curved scales extending to the wing joint; scutellum black, covered with long slender curved scales; pleura black, with long white spatulate scales; metanotum black.

Abdomen black, covered with black and white or "dirty-white" scales, so arranged as to make a slender median light line, transverse white bands mostly basal, but involving both segments, and on the more caudad segments are almost entirely apical, the distal segments being in some cases mostly white; white lateral spots, which are really extensions of the

*A new American mosquito.

The University Bulletin, The George Washington Univ., Washington, D. C.,
Jan., 1907.

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white scaling of the venter, and on most of the segments extend the whole length.

Legs: coxæ and trochanters light, and white-scaled; femora white ventrally, speckled black and white dorsally, a narrow black ring just proximal to the tiny white knee spot; fore and mid tibiæ white ventrally (on the hind legs this is reduced to a white line), speckled dorsally, a little darker near the apex, but the apex light, and in the hind legs there is a distinct dark band and light apex as on the femora; metatarsi speckled, those of the fore legs having light apices, of the hind legs having both slightly lighter bases and light apices. On the fore legs the first tarsal joints are black, with basal light bands, all the other joints dark; on the mid leg the first and second joints are still a little speckled, and have white basal bands and tiny white apical spots, sometimes unbanded, third and fourth joints dark; on the hind legs the first and second joints are dark (black), with basal and apical light bands, the third has a basal light band, and the fourth is light; all ungues equal and uniserrate.

Wings clear, speckled with black and white scales, the costa being mostly black, and the sixth long vein white, first submarginal a little longer and more narrow than the second posterior cell, the petiole in each case about half as long as the cell; mid cross-vein twice as long as the "supernumerary," and equal to the posterior cross-vein, which is about its own length distant; halteres, light stem and dark knobs.

The leg banding involves both sides of most of the joints, and in this greatly resembles *G. Currici*, the thoracic marking suggests *G. lativittata*, but the abdominal marking is clear, in some cases being only clean-cut lines, in others a little ragged. The types do not, however, suggest either species more than to indicate their close relationship, having a peculiarly tidy appearance which the others lack.

Length, 7.5 mm.

Habitat, Fort Lincoln, N. D. Taken June, July, August.

Grabhamia grisea, n. sp.—(Female.)

Head dark, covered with slender curved scales, light ochraceous on the occiput, a triangular space of darker golden brown, scales just external, and ochraceous flat scales on the sides, no fork scales; antennæ brown, verticels brown, pubescence light, basal joint brown, covered with flat ochraceous scales; palpi entirely brown scaled; proboscis brown, a light band, narrow on the dorsal and wider on the ventral aspect, at the apex of the proximal half; clypeus brown; eyes brown and gold.

Thorax dark brown, prothoracic lobes with slender curved light brown scales; mesonotum with slender curved scales, a distinct bare (dark) median line, immediately laterad of which on either side is a broad stripe of bright brown scales, then a light golden brown or ochraceous stripe extending cephalad from the scutellum to nape, external to these on the caudad half are the darker brown scales, and the lateral portion of the dorsum is covered with the lighter brown scales; scutellum dark, with light brown or ochraceous scales, and long light bristles on the margin; pleura ash-brown, with white scales; metanotum dark brown.

Abdomen dark, heavily and closely covered by flat ochraceous scales; two tiny dark submedian points not large enough to call spots, and yet very distinct, on all the segments but the first, which has a large bunch of almost white scales and light hairs; ventrally the abdomen is also covered with ochraceous scales, but not so heavily as dorsally.

Legs: coxæ and trochanters mostly light-scaled; femora dorsally sprinkled with dark brown and ochraceous scales, darker toward the apex, but the very apex white; ventrad, caudad and cephalad aspects ochraceous. Tibiæ much like femora but darker, and on the hind legs have a distinct dark apical band; metatarsi on fore legs much like tibiæ, and all the following joints missing; on mid legs also much like tibiæ; tarsal joints dark, the first and second with small ochraceous basal spots; on the hind legs the metatarsi are quite dark but still slightly sprinkled with light scales, and it and all the tarsal joints except the fourth are heavily basally white-banded, the fourth dark; all unguis uniserrate.

Wings clear, mostly dark-scaled, especially near the costa, the sixth long vein mostly dark, first submarginal a little longer and about half the width of the second posterior cell, the stems in each case about two-thirds the length of the cell; cross-veins nearly equal in length, the posterior about its own length distant from the mid; halteres mostly light, a little darkened on the knobs.

Length, 5-6 mm.

Habitat, Boise Barracks, Idaho. Taken July.

This evidently lies near *G. Fletcherii*, but the abdominal marking is distinct, and the specimens of *Fletcherii* which I have seen do not show a marked band on the hind metatarsi, nor a white band on the proboscis.

Both species were collected by the Surgeon U. S. Army, on duty at the respective places, but in one case the name was not sent in.

NOTE ON *EUCHÆCA PERLINEATA*, PACKARD.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

In February of last year Mr. Pearsall described as a new species, under the name *Euchæca exhumata*, a moth standing in nearly all collections as *E. perlineata*, Packard; and he is now,* in order to justify his action, endeavouring to show that the original *perlineata* of Packard was not what we all supposed it to be, but something quite different.

In the course of his researches he has found two specimens in the late Dr. Lintner's collection, labelled *Larentia perlineata*.

If these are really Packard's original types, as Mr. Pearsall assumes, and as, for the sake of argument, I am ready to admit; and if, further, they are really specimens of *Euchæca comptaria*, Walker, as Mr. Pearsall asserts, and as is quite possibly the case, and for the sake of argument I will admit this too—though I think that in the face of the original description and original figures of *perlineata*, and of the universal usage to which I have before called attention, and in view, further, of the fact that Mr. Pearsall has admittedly made some mistakes in his determinations in this genus, I might be justified in hesitating to accept his dictum in these points—what then?

It merely shows us that Packard had a very confused idea of his own species; that he had indeed two species mixed, which is quite probable, and that while he figured one form, which had not previously been made known to science, and, as I believe, wrote his description from the same form, he placed his type labels on another quite distinct form (almost indistinguishable from a species of his own which he had described at the same time and on the same page) which had previously received the name *Tephrosia ? comptaria* from Walker.

Under these circumstances, possibly Mr. Pearsall would be justified in giving the figured species a new name as he has done, but for my part I think it would be fairer to Packard, and much more convenient to students, to allow the old name to stand.

I really cannot acknowledge the propriety or see the advantage of changing a well-known name backed up by a capital description and two unmistakable figures, and, I repeat once more, by a usage of 30 years, just because there is a possibility that two ancient specimens in a certain collection may have been the original types, and may have been correctly determined by Mr. Pearsall as specimens of another species. I shall,

*CANADIAN ENTOMOLOGIST, XXXVIII, p. 36.

therefore, without, however, any desire to dictate to those who prefer to take a different view, continue to write :

Euchceca perlineata, Packard.

= *exhumata*, Pearsall.

There are other points in Mr. Pearsall's article upon which one might comment, but I am very reluctant to take up further space in discussing a question of which the readers of the CANADIAN ENTOMOLOGIST must by this time be very tired.

NEW HYMENOPTEROUS PARASITES OF ANTHONOMUS GRANDIS, BOH.

BY J. C. CRAWFORD, U. S. DEPARTMENT OF AGRICULTURE.

Torymus anthonomi, n. sp.—♀. Dull greenish, showing purplish tinges, especially on abdomen; head and thorax with abundant whitish pubescence, finely, closely punctured, the prothorax rather indistinctly transversely aciculated; temples narrow, making the head very narrow antero-posteriorly; cheeks, from eyes to base of mandibles, carinate; scape light reddish, flagellum dark; femora aeneous, tibiae light reddish-testaceous, tarsi whitish, apically dark; metathorax almost perpendicularly declivous, basally with short longitudinal rugæ, the centre ones longer, median one reaching almost to insertion of abdomen, rest of surface finely shagreened; metathoracic spiracles long oval; wings hyaline, stigmal vein two-thirds the length of postmarginal; marginal twice as long as postmarginal; abdomen very finely transversely lineated.

Length, 3 mm.; ovipositor, $1\frac{1}{2}$ mm.

♂.—Differs from ♀ only in the usual sexual characters and in size. Length, 1.75 mm.

Type locality, Waco, Tex., Aug. 29, 1906; also from Hallettsville, Tex., Aug. 9 and 30, 1906, 2 ♀. From Mexia, Tex., 1 ♀, Sept. 29, 1905, bred from *Brachytarsus* in heads of *Sideranthus rubiginosus*.

Type number 10040, U. S. Nat. Mus.

Urosigalphus anthonomi, n. sp.—♀. Black, shiny; legs red, thinly clothed with inconspicuous white hairs; antennæ and mandibles reddish, the antennæ 14-jointed, reaching to base of abdomen; antennal grooves very short; between antennæ the grooves distinctly carinated at edge, the outer edges not with distinct carinæ; inter-ocellar area elevated to a truncate pyramid, the ocelli at the bases of the sides, face with strong close punctures, behind ocelli coarse; median area of mesonotum rugose, not

so coarse anteriorly, lateral areas finely punctured; scutellum elevated, rugose, posteriorly a narrow, smooth shining border; truncation of metathorax rounded by a strong salient rim, elevated at centre dorsally, surface of truncature coarsely punctured; base of metathorax with a few strong longitudinal rugæ and a median longitudinal carina joining the median elevation of salient rim; abdomen somewhat reddish toward base, rugose with coarse punctures, the intervening elevations forming longitudinal lines, especially in basal half; apex of abdomen with two long sharp spines, ovipositor hardly as long as the abdomen.

Length, $3\frac{1}{2}$ mm.

Brownsville, Texas, Aug. 19, 1895, C. H. T. Townsend coll.

♂.—Similar, the antennæ longer, 14-jointed; no reddish on abdomen, carina of antennal grooves more distinct. Length, $3\frac{1}{2}$ mm.

Brownsville, Texas; bred Sept. 20, 1906, W. D. Pierce.

Type number 10041, U. S. Nat. Mus.

Urosigalphus Schwarzii, n. sp.—♀. Black, shining, legs red, the hind tibiæ and tarsi reddish-fuscous, head and thorax covered with abundant short white pubescence; face finely, rather closely punctured; antennæ dark, 14-jointed, obscurely reddish, reaching to base of metathorax; antennal grooves deep, reaching to posterior ocelli; a narrow shallow depression from centre of front to insertion of antennæ, broadening upwardly, the edges of upper part subcarinate; above insertion of antennæ these carinæ become the carinæ of the inner edges of antennal grooves; mesothorax except lateral areas coarsely rugoso-punctate; lateral areas medially smooth, very shiny, finely sparsely punctured, scutellum elevated, postscutellum with a small median V-shaped elevation, the point caudad; truncation of metathorax coarsely punctured, the surrounding carinæ elevated at dorsal centre; wings slightly dusky, costa and stigma very dark, rest of nervures brown; radius obsolete beyond basal third of marginal cell; abdomen coarsely, closely punctured, basally the intervening surface forming distinct longitudinal ridges, apex of abdomen with two short blunt spines; ovipositor about as long as abdomen. Length, 3 mm.

♂.—Similar to ♀ except in sexual characters; antennæ reaching one-third of distance to tip of abdomen, 14-jointed. Length, 3 mm.

Five females, one male, Cacao, Trece Aguas, Alta Vera Paz, Guatemala, E. A. Schwarz and H. S. Barber coll.

Type number 10042, U. S. Nat. Mus.

NEW ANTHIDIINE BEES FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLO.

Anthidium tenuifloræ, n. sp.

♀. Length about 10 mm.; black, with pale pubescence, that on head and thorax above faintly yellowish; ventral scopa sepia-brown, except at the sides, where it is pale; head with no pale markings, except a round cream-coloured spot above summit of each eye; mandibles 6-dentate, the third to fifth teeth smallest; lower edge of clypeus crenulate, with a tooth on each side, followed by a smaller one; clypeus very densely punctured; scape all dark; thorax without light markings; tegulae cream-coloured in front, and with a small light spot behind; legs black, tibiae with a light spot at extreme base, and hind tibiae with more or less of a streak at apex; hair on inner side of hind tarsi coppery-red; abdominal bands cream-colour, slightly interrupted in the middle, and broadly emarginate above laterally.

♂. About the same size; clypeus, lateral marks (extending a little above clypeus), and most of outer surface of mandibles, as well as a stripe on scape, cream-colour; stripe on middle of anterior tibiae and outer side of basal joint of all the tarsi cream-colour; tubercles and scutellum wholly dark; lateral apical lobes of abdomen broadly rounded, not curved inwards or pointed, their breadth about equal to the space between them and the central spine.

Hab.—Boulder, Colo. (*W. P. Cockerell*); 1 ♂ June 12, 1905; 1 ♀ same date; 1 ♀ Aug. 8, 1906, at flowers of *Psoralea tenuiflora*, Pursh.

I had confused this with *A. emarginatum*, Say, to which it is very closely allied; but it is easily distinguished by the colour of the scopa in the ♀, and the dark tubercles and scutellum in the ♂. The general structure, venation, etc., agree with *emarginatum*. The real *A. emarginatum* occurs at Ward, Colorado.

Anthidium porterae personulatum, n. sub-sp.

♀. Clypeus entirely black; lateral face-marks small, oblong, not nearly filling space between clypeus and eye; lateral marks on mesothorax rudimentary.

♂. Ground colour of abdomen quite black; apical lobes and spine entirely black; yellow marks on scutellum smaller.

Hab.—Boulder, Colo. (*W. P. Cockerell*); both sexes at flowers of *Psoralea tenuiflora*, Pursh., Aug. 8, 1906.

The genuine *A. porterae*, Ckll., is common at Boulder, visiting *Psoralea tenuiflora* and *Grindelia*. The males mostly have the abdomen very red (var. *amabile*, Ckll.), but the females do not show this variation.

Dianthidium Sayi, n. n.

This is the *Megachile interrupta*, Say, 1824; *Anthidium interruptum* (Say), Sm., but not *A. interruptum*, Fabricius, of much earlier date.* It has been referred in recent years to *A. curvatum*, Smith, but that is a species from Georgia, with the legs mainly yellow, whereas in *Sayi* they are red in both sexes. *D. Sayi* is not uncommon in Colorado. I have before me specimens from Trinidad, Colo., July 13, 1899 (*Titus*), and Boulder, the male, Aug. 7, 1906, at flowers of *Grindelia*; the female Aug. 8, 1906, at flowers of *Helianthus lenticularis* (both coll. *W. P. Cockerell*).

In my original account of *Dianthidium* I cited *D. curvatum* as the type; *curvatum*, Auctt. (not Smith) = *Sayi*, was intended.

At Mesilla, New Mexico, Aug. 23, I took a female representing a new sub-species, *D. Sayi xerophilum*, in which the ferruginous colour has overspread practically all of the head and thorax, except the disc of mesothorax, and the abdomen above is bright yellow with narrow ferruginous bands, the basin of the first segment and most of the apical segment also ferruginous. There is a wedged-shaped black area below each antenna, and laterad of this a yellow suffusion. The legs are entirely red.

A NOTE ON GENERIC TRANSFERS.

In the December CANADIAN ENTOMOLOGIST, p. 415, Mr. Pearsall gives convincing reasons why the species of *Tallegeda* should be referred to *Philopsia*, but he does not provide the resulting names: *Philopsia montanata* (Packard) and *Philopsia tabulata* (Hulst). Similarly in the December *Entomological News*, p. 370, *Stilpon Houghii* is said to belong to *Chersodromia*, but the name *Chersodromia Houghii* (Mel.), is not written. Entomologists are so busy with other matters that it never occurs to them, in the majority of cases, to pay attention to little details of this sort; yet, when we have adopted more exact bibliographical methods, following the lead of the ornithologists and botanists, these omissions will be found to occasion a good deal of inconvenience. Thus, the first citation of a particular binomial will often have to be from some incidental mention, instead of from the place where the reason for the transfer is given. I cannot doubt that entomologists generally will see the advantage of the precise methods advocated if they consider them a little. Of course, if the number of species involved is large, the transfer of a few of the best known will give the appropriate clue to the user of a bibliography.

Incidentally, I may suggest that Dr. Williston (CAN. ENT., Dec., p. 388) should have hesitated to print the names *Stomoxiidae*, etc., even as awful examples, remembering Dr. Palmer's solemn treatment of a similar venture of Rafinesque's, in his recent index to the Genera of Mammals!

T. D. A. COCKERELL.

*Nor *Megachile interrupta*, Spinola, 1806.

NEW HISTORIES IN PAPAPEMA (HYDROECIA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XXXV, p. 94.)

Just how far patient endeavours may go unrewarded without a complete despair attending, is often well brought out in entomological studies. The quest of such boring larvæ as the Noctuid genus *Papaipema* possess, gives us a good trial oftentimes, since their hidden whereabouts within some unexpected root or stem frequently leads one a merry chase indeed. Knowing, however, that a certain species has been apprehended in the moth state at a given locality, in the not too remote past, there is a reasonable assurance that somewhere here, in some unknown food-plant or underground root, there lurks the desired larva, no doubt in the goodly company of many others of its kind. To know this food-plant and to learn this habit are the questions which confront the seeker in Gortynid lore, and it is surprising how long we may look, and, for a fact, overlook such a species, the while a most critical search goes on for its apprehension. Many years since an imago of *Papaipema circumlucens* was taken at Rye, and for the last decade an unremitting search has been made for a discovery of its larva. But fortune smiles at last, though the final meeting is so unexpected and commonplace withal, that it savours more of carelessness than of success.

A slight resume touching this species may now be admissible, since the literature has but few references to it. Prof. J. B. Smith, in a revision of the genus (1897), first accords to it specific rank. The few examples in collections at that time, together with several other species, stood in an aggregation under the *rutila* label. His differentiation is based on well-detected grounds, and the larva, now that it has come to light, aids still further the individuality. A few other citations of catalogue or locality reference are all else that pertain to the species.

The imago shows some slight colour variation, the one bred locally being that in which the tone is dull red-brown, the ordinary spots large and pure white; a very noticeable white scale is situated at the base of the primary, this the more so as the basal area is concolorous and barely defined. In the other direction specimens become redder, or the lower median field of primaries may be strongly sprinkled with yellowish scales, giving a powdered effect. Its early history was unknown.

In July, 1904, the few accessible Hop-vines in the locality were examined for the borings of *Gortyna immanis*, this well-known species

being desired in the larval state for comparisons both in the home and other collections. Investigations of the plant disclosed a fearful state of insect depredation, quite enough to discourage any attempt at rearing the Hop here on a large scale. The root was our objective point for *immanis*, as by this date the young larvæ should have left the extremities of the vine and sought the more bulky root-stock for an abode. No larvæ are to be found, however, and attention turns to the other insect foes which are so sadly in evidence. Broods of coleopterous larvæ, accompanied by their parents presumably, have the foliage half riddled, and later this work is complete. They were assisted by four different species of lepidopterous larvæ, and a tiny Micro soon takes up an abode at the blossoming end, feeding upon forming seed-vesicles. A long cylindrical gall on a main stalk, upon being opened, discloses a nest of wriggling, yellow maggots, the young of the true gall-fly doubtless, since the growth seems to have been so recently formed. Surely the local Hop has enough to contend against without *immanis* at hand to gnaw them off at the root, since this is one of its tricks, as chronicled by the economic writers, and there would be no chance for the vines at all if the latter occurred here plentifully. Not recalling that the Hop was listed as being given to any gall-maker, causes some attention to centre here. A number of the galls prove more tapering and of larger diameter than the one first opened, and one is seen to have the end gnawed out in a peculiarly suspicious manner. A half-hearted search discloses a well-developed Gortynid larva, much discomfited at such reckless trespassing. And so this must be *immanis*, not working at the vine's tip nor down by the root as we have been informed, but midway in a tidy gall, one which in no way interferes with the plant's growth. Later on these larvæ are found to still cling to their comfortable galls, maturing there and producing no visible harm in the growth of the stalk. From which it would appear *immanis* has been a much-maligned species at the hands of the economic writers. But this conclusion was hasty.

Examples are secured for inflation, and a very few go on to pupæ in the breeding cage. A short pupal stage is followed by an emergence, not of the Guenée species, but the long-sought *circumlucens* of Smith. It so happened that the plants examined locally were widely separated, yet in every case there were numerous galls containing the *circumlucens* larvæ upon each, and they are so evident and plentiful that it becomes at once a most easy species to apprehend. It is recalled how in exchanging for

immanis with distant collectors, *circumlucens* often accompanied the former as representative of the locality, confirming the fact that we have here a general and preferred food-plant. But why has this larva been overlooked so long, especially where Hop is raised for a business, and where the work of *immanis* is so well known and deplored? It seems explainable only in that the *circumlucens* larva has been mistaken for the other, and its transformation never fully observed.

But while exploiting the doings of the gall-dwellers, a watch for the regulation procedure of *immanis* at the root was kept up, and while no larvæ or indications of their work appeared, a pupa occurred at the base of one vine, and a female imago on the same occasion was disturbed in the foliage. At this time the gall larva had just passed the final moult, and it appeared there must be great irregularity somewhere. So the final results were not quite so unexpected, the surprise being that the species should prove the very evasive *circumlucens*.

During the two succeeding years the life-history has been fully observed, one of the characteristic features brought out being the early emergence of the imago and the very short time which elapses at this period. Thus in 1905 a lot of twenty-two examples emerged in four days in the following order: two, sixteen, one and three respectively for the period named, and the same concerted appearance was noted in the brood of the succeeding year. With *nitela*, representing an opposite extreme, the emergence would likely run through twenty days in this number of examples. Under such circumstances, as might be expected, ova are deposited the first night, and are placed in clusters of three to six. Their form is spherical, flattened at the micropyle so this diameter is one-sixth less than a lateral measurement, and agrees with its congeners in sculpture and colour. The eggs are placed on and about the base of the vines, in any sufficient crevice, and pass the winter in this state. On May 28, 1905, the newly-hatched larvæ were observed at 10 a.m. ascending the vines and taking up their quarters, well toward the tip, where the parts are tender. At this date vines have grown six feet or more, and occasionally three or four larvæ locate in one stalk without serious detriment to its growth. The plant immediately notices the intrusion, however, in that the gall-like swelling at once begins. Sometimes a leaf petiole is entered, and then there is trouble shortly, the leaf withers, its stem turns yellow, and the larva makes a change of base to more stable territory, further on up the stalk. Growing so rapidly as does the Hop, every few days offers a point of vantage at an increase of stem, so that a larva subsequently ascending

may drill a cavity further on than its predecessor. Twenty minutes proves sufficient for ensconcing themselves from view.

The newly-hatched larva is of the usual delicate, semilooping character. The second stage finds them in a well-developed gall, which lengthens and enlarges as subsequent conditions demand. The third stage shows the typical *Papaipema* attributes in evidence, and we are able to place the larva in one of the three sections into which the group is divisible. The fourth stage is entered about July 1, and we find a larva belonging to the so-called *nitela* series, in which the dorsal line alone is unbroken and continuous. The colour is dark purple-lake, upon which the usual longitudinal dorsal, subdorsal and substigmatal lines show contrastingly drawn in white. The two latter stop abruptly on either side of the first four abdominal segments. The general features are normal; the thoracic shield edged with black, which continues as a noticeable line down the side of head. Spiracles black, tubercles not prominent.

In the penultimate stage we have a larva showing considerable individuality. The body is less cylindrical than usual, and is much flattened ventrally, length 33 mm. Head normal, side line has disappeared. The wrinkled skin on the three thoracic joints accentuates the slight constriction here. All tubercles bear well-developed setae, plainly seen without a lens, and is a feature not equalled by other species. Tubercle iv a, on seventh abdominal segment, is wanting in this species. Neither spiracles nor tubercles are strongly shown, being nearly concolorous with the body, which is a pale brownish-clay colour. Dorsal line is alone unbroken.

At maturity the insect larva measures from 38 to 40 mm., and attains full growth about July 20th. The colour has faded to a neutral translucence, the principal comparative feature being the absence of the accessory tubercle iv a on joint ten. Pupation occurs in the ground, and lasts about twenty-five days.

The pupa is normal, more tapering posteriorly than some others; at the anal extremity are two divergent, slightly-hooked spines.

Considering the diameter of Hop-vines, the gall produced is rather singular. It takes the form of a cigar-shaped enlargement, from three to six inches in length and a half inch in diameter. The twining propensity of the vine makes it assume a crescent shape usually, and the larva always maintains a very large aperture at the lower end for ventilation and housecleaning. At maturity a large ragged opening is made at the upper end, through which the larva escapes. It is then eaten through to a very

thin shell in all places, for its bulk is really small to have sufficed for so lengthy a larval period. It is, in fact, one of those unexpected food-plants in which we occasionally meet our boring Gortynæ. That they should choose the stems of our largest plants, as *Helianthus giganteus*, *Heracleum lanatum* and such, appears fitting; or that a fleshy root like *Aquilegia* should be tempting is to be expected, but for a climbing vine, a delicate fern or the modest pitcher-plant to tempt them is beyond ordinary expectations. Notwithstanding, we have a major part of the life-histories of these borers now known, and at the price of eternal vigilance the others will be rounded-up some day.

The author would take this occasion to correct a former inference whereby it was assumed that the young larvæ of *Papaipema* hibernated in the first stage. The true facts are that the winter is passed in the egg state, and the young come forth about the first of June in this locality. The error occurred some years ago with the first ova ever obtained, when some minute mites ate out the contents of the egg, leaving the empty shells, from which it was presumed the larvæ had hatched. The following year the mites were caught in the act, and the true condition of affairs determined.

GEOMETRID NOTES

ON THE GENUS *SYNELYS*, HULST.

BY L. W. SWETT, BEDFORD, MASS.

Having received so many different forms of *Synelys alabastraria*, Hub., from various collectors, I determined to straighten out the tangle in the group. To start with, of course, it was necessary to know just what *alabastraria* of Hübner (Zutr. exot. Schmett, ii, fig. 311, 1825 ?) was. In the first place, I found almost all writers on the subject had been guilty of spelling the name incorrectly; and secondly, that the plate differed from any Geometer known to me, as the three forms that occur with us have no ochreous under side, and the rust-brown markings on the upper side were different. At the beginning of my work I believe the various collectors placed the three forms as follows: 1, *enucleata*, Gn., as the form with large dark blotches on the fore and hind wings. This species also has often been misspelled. 2, *alabastraria*, as the form without dark blotches on fore and hind wings. 3, the form with a single black patch on inner margin of fore wings, and figured by Guenée (Plate 12, fig. 3) as simply var. A of *enucleata*, without name. I determined, therefore, to send all three forms to the British Museum to see under what names of Walker they would be.

Sir G. F. Hampson most kindly assisted me with the identifications, with the following results: that 1, the form with dark blotches on both sets of wings, is the *enucleata* of Guenée, the type being in Mr. R. Overthur's, of France, collection; the description is so plain, and Packard has specimens compared with Guenée's type in his own collection, which I have seen, therefore I believe this form is correct. In regard to *S. alabastraria* (2), which Rev. G. W. Taylor was the first, I think, to strike from our list correctly, Sir G. F. Hampson stated it to be a foreign noctuid of the genus *Palindia*, from South or Central America, which is accurate, despite Hübner's locality; as one can see, it does not belong to the Geometridæ; 2, the unspotted form, therefore, which was regarded as *alabastraria*, is left without varietal name, and going back we find the name *restrictata*, Walk. (Plate 13, fig. 52 of Packard's Monograph), which, being the oldest, should stand; 3, the form with blotches on fore wings only was never named by Guenée or Walker, therefore I propose the varietal name *relevata* for it. Thus we have the three forms correctly placed. For information on the subject, I made use of Hulst's notes on Walker's types (*Ent. News*, Vol. vi, No. 3, p. 72); Grote (*Trans. Am. Ent. Soc.*, ii, p. 82, 1868); Walker in *Cat. Brit. Mus.*; Guenée in *Spec. Gen.*, 9, p. 505, 1857; Dyar in *Psyche*, 9, p. 165, 1901; Goodell, *CAN. ENT.*, XI, p. 194, 1879, and XII, p. 236, 1880; and lastly, Packard's Monograph and Holland's Moth Book. I am pleased to acknowledge the loan of specimens or help from the following gentlemen: Sir G. F. Hampson, Rev. G. W. Taylor, Dr. Dyar, Mr. Grossbeck, Mr. Broadwell, and Mr. Blackburn. I have a large series of specimens from southern, northern and western localities; my types of var. *relevata* are ♂, New Windsor, N. Y., 2, vii, 1897; ♀, New Windsor, N. Y., 22, vi, 1893; co-types ♂ in British Museum, ♀ in Boston Society Natural History.

The synonymy is as follows:

Synelys enucleata, Gn., *Spec. Gen.*, IX, p. 505, 1857.

{ fig. 67, Plate 10, Packard's Monograph.

{ fig. 5, Plate 43, Holland's Moth Book.

var. *a. restrictata*, Wlk., *Cat. Brit. Mus.*, Vol. 22, p. 722, 1861.

• *mensurata*, " " " " " 35, p. 1621, 1866.

Syn. { *continuaria*, " " " " " 35, p. 1622, 1866.

{ *reconditaria*, " " " " " 23, p. 786, 1861.

[*P. alabastraria*, a noctuid, drops from lists.]

var. *b. relevata* [fig. by Gn., Pl. 12, fig. 3, var. A], nov. var.

EUCHÆCA AGAIN.

In my last paper listing these species, I contended that *exhumata*, Pears., being a valid species, the name should stand. Recently, in studying the types of *Tephroclystia* in the Hulst collection at New Brunswick, N. J., I made the unpleasant discovery that the type of *inornata*, Hulst, is a worn specimen of *Euchæca exhumata*, Pears. My name must, therefore, give place to that of *Euchæca inornata*, Hulst, with *exhumata*, Pears., as its synonym.

R. F. PEARSALL, Brooklyn, N. Y.

GALL GNATS OR CECIDOMYIIDÆ.

The Gall Gnats or Cecidomyiidæ are best known on account of the ravages of certain species, such as the Hessian fly, wheat midge, pear midge, and others. These relatively few species have inflicted enormous losses upon American agriculture in the last century. Representatives of this family present many interesting morphological variations, and possess marked differences in habits. There must be a very large number of species in America, as a recently-issued catalogue of Diptera lists over 750 European species referable to some 87 genera. We already have in our collections in the vicinity of 500 species of these small flies, and it would not be surprising were this number largely increased as a result of further collecting. The members of this family are all small, ranging in size from about .5 cm. to .5 mm., or even less. These insects have but few veins

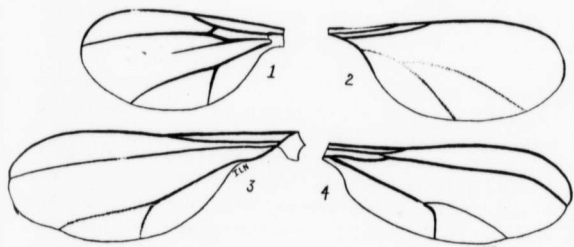


FIG. 6.—Typical Cecidomyiid Wings: 1, *Campylomyza*; 2, *Lasioptera*; 3, *Mayetiola*; 4, *Porricondyla*.

(fig. 6); the costal vein is continued along the posterior border of the wing, and is almost always narrower than the anterior border, while the

tibiæ are unarmed. The antennæ have from six to twenty-eight segments. Members of this group have a characteristic appearance, which, once recognized, enables one to easily separate most of the species from allied forms. The adults are usually yellowish or reddish, though some of the species are dark brown or even black.

Representatives of this family may be found at almost all seasons of the year, and in nearly every conceivable place. Some breed in decaying wood or under bark, others subsist upon low plant forms, such as fungi and lichens, some upon decaying vegetable matter, while a number of our better known species produce the familiar vegetable deformities so frequently associated with this family. Gathering the galls at the time when the insects are nearly ready to transform, often results in obtaining excellent specimens, though special collecting from various food-plants has proved far more prolific in species, but this latter method does not permit the definite association of the insect with its food-plant. Certain species appear to be closely limited to one plant, while others are capable of subsisting upon a variety. Some forms require an entire year to complete the life cycle, and others may produce several generations in a season. Field collecting is most successful in sheltered spots, or when there is comparatively little wind, and is apt to be more productive a day or two after a rain. We have found a window in an open shed a very satisfactory collecting place, provided it was kept free from cobwebs, and have succeeded in taking 10 species therefrom in as many minutes.

We have undertaken a serious study of this interesting group, and it is desired to enlist the co-operation of all interested in the advancement of science, as we wish to secure specimens from different sections of the country, in order that our studies may more adequately represent the American fauna. Adults may be taken in a close net, and from this transferred to a cyanide bottle, in the bottom of which there is a loose wad of absorbent cotton so that the insects will not shake around; they should then be put into either pill boxes containing absorbent cotton or placed in small vials with 50 per cent. alcohol. The latter should be filled with fluid, or, better still, a small amount of cotton may be inserted so that the insects can not float about, and in this way lose the terminal segments of the appendages.

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Mailed April 5th, 1907.