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ENTOMOLOGY FOR BEGINNERS.

TIGER BEETLES.

BY R. V. ROGERS, KINGSTON, ONT.

There are probably over ninety thousand different species of Beetles in the world, and first and foremost of this mighty legion stand the Cicindelidæ. Well, therefore, might they demand our attention from their high position in the Coleopterous world alone; but they have many other claims on our consideration. They are cosmopolitan—no pent-up Ithaca contracts their powers; they are beautiful; they are fierce; they are blood-thirsty; they are useful; and the family name is an old one—known to scientists and men of letters in the days when Jupiter and Juno were king and queen of heaven, to the inhabitants of old Rome.

The family is divided into several branches; in Canada we have only the representatives of one branch, but it is the original one, the Cicindelæ. In the United States there are a couple of other branches as well, which reside principally far to the west.

There is much in a name. The patronymics Smith, Barber, Wright, tell the origin of the family at once; so *Cicindela* informs us that those that are so called are "bright and shining ones," while the English cognomen of Tiger Beetle lets all Anglo Saxons know that it is a creature that lives by preying on the blood of others. Brilliant, beautiful and elegant in shape are these beetles, and they appear to revel in the merry, merry sunshine; on every bright summer day they are to be found running and flying about sunny banks, sandy places and wherever the god of day beats down his life-giving rays; most of them avoid vegetation, as it would check their rapid progress; some species, however, linger in grassy spots among scattered trees. They are among the most predaceous of the Coleoptera; "they act like the tigers among Mammalia, the hawks among Birds, the crocodiles among Reptiles, or the sharks among Fishes." In some of them activity, as well as brilliancy of coloring, is

carried to the greatest perfection. In the tropics some few genera are found which alight only on the leaves of trees, but further north they are all terrestrial. The species are more numerous in the temperate and sub-tropical regions, and gradually disappear from view as we journey towards the north pole, until in the latitude of Manitoba (as we are told) but two or three are to be found.

Let us take our *instrumenta belli* and go in quest of some of the dozen species we have in Canada (in North America there are about one hundred). Let us hurry before yonder clouds obscure the sun, for then—like chickens in an eclipse—they will retire to their homes. Here is a likely spot, and there are some specimens of our commonest species (*C. vulgaris*). Go for that one! He sees us as quickly as we spy him, and is off, flying rapidly for a few yards and then coming suddenly to the ground with his head towards the enemy. Again and again we start him; at length he tires of the chase and takes a longer flight than usual; we know his little plan, and hurry back to where we first saw him in time to see him alight all unsuspectingly, and we easily take him captive in our toils. Let us examine him. He savagely moves his mandibles and tries to pinch, but his bite is inoffensive and not very painful. Some of them give forth a rather strong scent. This one is a little over an inch long, but barely a quarter of one broad; his head is very large, for he has brains; his jaws are very strong, for he has an appetite, and long and curved—a couple of scimitars, in fact, by which he cuts and carves the quivering carcasses of his prey. His eleven-jointed antennæ are graceful, long and slender. 'Tis true that his back is of rather a dull purple color, but beneath he is resplendent in a beautiful bright brassy green. Each wing cover is adorned with three whitish irregular stripes. His legs are long and slender, just the things on which to hunt the active insects which he feeds upon.

Michelet speaks of the beauty of one of the next of kin of the captive in our fingers thus glowingly: "The rich and living aliment of the unfortunate insect victim apparently communicates to the Cicindela its glowing colors. Its entire body is embellished with them; on the wings a changeful besprinkling of peacock's eyes; on the fore parts numerous meanders, diversely and softly shaded, are trailed over a dark ground. Abdomen and legs are glazed with such rich hues that no enamel can sustain a comparison with them; the eye can scarcely endure their vivacity. The singular thing is, that beside these enamels you find the

dead tones of flowers and the butterfly's wing. To all these various elements add some singularities, which you would suppose to be the work of human art, in the Oriental styles, Persian and Turkish, or as in the Indian

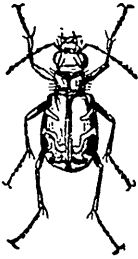


Fig. 10.

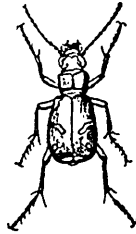


Fig. 11.



Fig. 12.

shawl, where the colors, slightly subdued, have found an admirable basis, time having gradually lent a grave tone to their sweet harmony."

When we have let go our common Cicindela, *Cicindela vulgaris*, fig. 10, let us look at the pictures of his—not sisters—but of his cousins and his aunts.

The Purple Tiger Beetle (*C. purpurea* Riv.) is figured as No. 11. It is nearly the same size as *vulgaris*, and is often to be found in its company. Its general color is a beautiful metallic purple; sometimes, however, it assumes a greenish garb. On either wing cover there is a bent



Fig. 13.



Fig. 14.



Fig. 15.

reddish line extended from the outer almost to the inner margin, a dot lower down and another at the extreme tip of the inner margin. It rather delights in chilly weather, and often appears before the snow is well gone.

Mr. Bethune says (Rep. Ent. Soc., 1873) that he has caught it in numbers in April, and on one occasion as early as the 17th March, before the snow was gone.

The Six-spotted Tiger Beetle (*C. sex-guttata* Fabr.), fig. 12, is a most beautiful insect of a most brilliant metallic green, flecked with three small white spots on each wing cover; Packard calls these markings "golden dots."

The Hairy-necked Tiger Beetle (*C. hirticollis* Say), fig. 13, is a common species closely resembling, though smaller than, *C. vulgaris*; it is distinguishable by having whitish hairs on its neck.

C. generosa Dej., fig. 14, is more strongly marked than the species already mentioned, and is considerably larger.

C. 12-guttata Dej. is smaller than *vulgaris*, brownish, and decorated with twelve smaller reddish spots.

C. punctulata Fab. is about the size of *C. 12-guttata*, and has a row of smaller dots along the inner margin of the wing covers, and a couple of irregular lines on each wing cover.

The Tiger Beetle may well be called a Beneficial Insect, and is a valuable and should be a valued friend of man, although some of the species living at the sea-shore feed upon small shrimps, to the loss of humanity. Although it does not, like that brilliant murderess, the Dragonfly (to quote again the gushing Michelet) clear the atmosphere of the gnats and flies that torment mankind, still with its crossed daggers, which serve it for jaws, it accomplishes a swift and almost incredible havoc among the smaller insects. We should take care of it and respect it. It is an efficacious auxiliary to the agriculturist. The farmer by killing Tiger Beetles becomes the friend of those insect hosts that fatten on his labors—the preserver and protector of those little enemies which devour his substance. The ferocity of these insects is remarkable. They quickly tear off the wings and legs of their victim, and suck out the contents of its abdomen. Often, when they are disturbed in this agreeable occupation, not wishing to leave it, they fly away with their prey; but they cannot carry a heavy burden to any great distance.

They are true children of earth. The eggs are laid in the earth, and in the earth the grubs are hatched, and in the earth they spend their days, and in the earth they prepare their shrouds, and enwrapped therein sleep their pupa sleep through the long winter, and with the returning warmth

of spring crawl out of their earthy chambers to run and sport on earth, seldom using their new found wings to fly away from their beloved mother.

The grubs are curious creatures—hideous hunchbacks, fig. 15, but possessed of brain and stomach. They live in the same localities as their parents, the anxious mother having wisely deposited her eggs where food will be most easily attainable by the larvæ. Let us examine a grub. LeConte says that we can easily procure one in spring by placing a fine straw down one of their holes, for the grub will push it out, and rising above ground in his efforts, may be captured. Here is a hole, and down goes a straw. Master Cicindela does not like vegetables, and so seeks to eject it with his broad head; when he shows himself we quickly seize him. A perfect Daniel Quilp we find him, with head enormous, flat, metallic color, armed with long curved jaws. The legs are six in number, and on the back, half way between the legs and tail, “are two curious tubercles, each terminating in a pair of recurved hooks.” The head and first division of the body are horny, the rest of the creature is soft. “The larva has all the desire for slaughter evinced by its parents, but its delicate skin, long body and short legs, not only prevent it from chasing prey, but from attempting a struggle with an insect of any size; nevertheless this imperfectly armed creature manages to obtain its food without exposing itself to much risk. With its short, thick, spiny legs it loosens the earth, and then using its flat head as a shovel, and turning itself into a Z, hoists up the clay and upsets it around the mouth of its intended hole. With head and legs, perseverance and time, it sinks a shaft as large in diameter as a lead pencil and about a foot in depth. (Dr. Duncan says that in England *C. campestris* runs a horizontal gallery as well.) The loose earth around the opening gives way on the approach of any insect and precipitates it into the jaws of the Cicindela, which then descends into its cavern and there at its leisure devours its food.” The insect crawls in its tunnel with ease, and if it wishes to remain set fast it sticks the back of its body against the sides and rests safely with the aid of its hooks. In this position it can poke its head out of the ground, thus closing the entrance of its tunnel and awaiting until some ant or other insect passes over. The top of the larva’s head forms the floor of the cavity, and when an insect touches it the larva descends at once and with great precipitation, and thus the victim falls into the hole. When fully grown the larva closes up the mouth of its abode, and in quiet and solitude undergoes its metamorphosis, lying dormant during the winter months.

COLLECTIONS OF THE LATE DR. ASA FITCH.

Having been requested by the family of the late Dr. Asa Fitch, State Entomologist of New York, to examine and report upon the condition of his great collection of insects, I visited Fitch's Point, Salem, N. Y., on the 12th and 13th of November last, and made as careful an investigation thereof as time and circumstances allowed. In the belief that the following items or notes are of general interest to all entomologists, they are respectfully submitted by Francis G. Sanborn, Consulting Naturalist, Andover, Mass. :

Dr. Fitch's "General Collection" of insects of all orders fills one hundred and six boxes ("Cartons liégés" of Deyrolle, nearly all of double depth, size 26 x 19½ cm.) and is now in excellent condition, suffering only to the extent of perhaps fifteen per ct. from a slight coating of dry mould, easily removed. No Anthrenids or other Dermestide is to be detected among them. Very few are badly broken or damaged, perhaps fifty in all out of upwards of fifty-five thousand numbers. Although chiefly from the U. S., the collection contains a fair percentage of European and other exotic species obtained by exchange with Drs. Sichel and Signorêt, and Messrs. Andrew Murray, Fairmain and others. The Coleoptera occupy eighteen boxes, the Orthoptera seven, Neuroptera six, Hymenoptera eight, Lepidoptera twenty-one, only four of which are Diurnal. The Hemiptera are nobly represented, the Heteropterous by fourteen, and the Homopterous by twelve; to this latter division, as most students are aware, the Doctor devoted an exceptional amount of attention, and apparently all of his types, as described in the N. Y. State Agricultural Reports for many years, are here preserved in excellent order. The Diptera occupy five boxes, and four more contain Myriapoda, Arachnida and Crustacea, chiefly terrestrial and local.

In addition, two large cases of 62 draws or slides, and several boxes of various forms, contain by rough estimate over one hundred thousand duplicate Coleoptera and above twenty thousand of all other orders, principally of the Doctor's own collecting from New York State. Many of these, however, have suffered from the ravages of *Dermestes lardarius*, though not exceeding twenty per cent. The Biological illustrations, chiefly "Galls," are now in excellent order and well arranged, but liable to disarrangement in transportation. A vast amount of patient labor is

displayed in several boxes of Cecidomyia and allied genera, which had been carded and studied with great care, but which we found nearly destroyed by the little *Ptinus fur*.

A few hundred interesting and chiefly minute specimens from Hong Kong, collected by the late Rev. M. S. Culbertson, and a goodly number of larger forms from South America, sent him by Sr. A. de Lacerda, had apparently never been incorporated with the general collection.

The Catalogue, descriptive, and apparently nearly exhaustive, at least as regards the New York species, is a library of itself in one hundred and forty-eight note books 10 x 16 cm. (if my memory serves me), and none much less than an hundred pages, in which each specimen is numbered (beginning in 1833), with its locality, date of capture and incidents, accompanied in general with a preliminary brief diagnosis, and followed by a fuller description. As previously stated, the numbers of specimens reach fifty-five thousand, though many have doubtless been exchanged or destroyed.

A large and valuable library containing many rare and curious works on Entomology in various languages, and several microscopes, among them a valuable Nachët made to order for the Doctor, are also stored in the little wooden building called "the office"—a few rods in the rear of the old dwelling-house. And the old shepherd dog that for some years past accompanied the venerable Doctor in his rambles, sleeps nightly on the mat at the entrance of the little "office," guarding the invaluable treasures which he may perhaps have helped to accumulate, while the busy brain and skillful hand of his old friend and companion are never more to acknowledge his faithful service.

DESCRIPTION OF A NEW GENUS AND SPECIES OF ZYGAENIDÆ.

BY BERTHOLD NEUMOEGEN, NEW YORK.

Genus EDWARDSIA, Neumoëgen.

Head small, nearly concealed by the thorax. Clypeus oblong, toothed in front, the middle tooth much the largest. Palpi moderately long, and

pilose beneath. Antennæ regular and closely pectinated. Thorax and abdomen stout, the former with the hair of patagiæ long.

Abdomen with small tuft. Wings of the form of *Alypia*, with long fringes. Legs moderately long, the fore tibiæ with bunches of hair as in *Alypia*; hinder pair with two nearly equal pairs of spines.

This genus appears to be closely allied to *Pseudalypia* Hy. Edwards, but differs from all known genera of its group by its remarkable system of coloration, as well as by the characters noted above.

Dedicated to my good friend, Henry Edwards.

EDWARDSIA BRILLIANS, n. sp.

Head black, hairy, with base of the palpi and margin around the eyes pure white. Labial palpi black, well extended beyond the front. Antennæ about one-third the length of costal edge of primaries, and glossy above. Thorax black, with a median line of white hair. Patagiæ free and large, white with black edges.

Abdomen metallic steel black, glossy, with a discal spot at its base, and anal tuft, dark orange.

Legs black. Femora with light orange colored tufts, and orange bands. Tibiæ with orange colored scales, the posterior pair with the spines orange.

Primaries with the costal edge, extreme outer margin and internal margin, black, and a broad, submarginal, maculate band of reddish brown; the spots increasing in size towards the internal margin. The central portion of the wing largely occupied with pure white. The submarginal brown band, as well as its interior white band, follow the shape of the exterior margin as far as the median nervure, in equal width. At the junction of the median nervure these bands enlarge to nearly double their width down to the interior margin. On the white field are two black streaks proceeding from base of the wing, that on the internal margin straight and nearly equal in width for about one-half the extent of the wing; here it narrows and is surmounted by two black lines directed towards the median nervure, and enclosing an almost oval spot. The other black line follows the course of the median nervure to a space within about two lines of the outer margin of the wing, where it broadens a little and curves upwards, joining the costa. Above the median line in the centre is an almost oblong, black blotch, toothed towards the outer margin, and enclosing an orange centre, nearly the shape of the Latin I.

Anterior to this and resting on the median line is also an orange, sublunar patch, bordered by black. The spaces between the lines and blotches, above noted, being pure white. Fringes long, very distinct pure white.

Secondaries smoky black, with a slight bronze lustre, and indistinct traces of orange discal spot and submarginal band. Fringes concolorous.

Under side entirely bronze black. The primaries with an orange submarginal band extending nearly from costa to the internal margin. A broader orange band from costa to a little below median nervure, and anterior to this a triangular orange spot, resting on subcostal nervure. Fringes as in the upper side.

Expanse of wings 1.32 inches.

Location, South-western Texas. Collected by Mr. J. Boll in season of 1879.

DESCRIPTION OF PREPARATORY STAGES OF ARGYNNIS ALCESTIS, EDW.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Conoidal, truncated, not so broad at base as *Idalia*, the sides less rounded; depressed at summit; marked vertically by about eighteen prominent, slightly wavy ribs, half of which extend from base to summit and form around the latter a serrated rim; the remainder end irregularly at two thirds to three quarters distance from base, sometimes squarely at one of the striæ, but usually curve towards and unite with the long ribs; between each pair of ribs are equi-distant transverse striæ. Shape of *Aphrodite* and *Myrina*, being more slender, narrower at base, and less convex on sides than the other large species of this genus. In Mrs. Peart's magnified drawings the eggs of *Alcestis* and *Myrina* are indistinguishable from each other. Duration of this stage 25 to 30 days.

YOUNG LARVA—Length .08 inch; cylindrical, thickest anteriorly, tapering backward, the dorsum sloping considerably; color brownish-green, translucent; each segment from 3 to 12 marked by eight rows of tubercular dark spots, six of them placed on dorsum and upper part of sides, each spot giving out a long black clubbed hair, which is curved

forward ; the other two rows are beneath spiracles (one on each side), and consist of much smaller spots, each with two or three short hairs ; still lower down, in a line over the feet, are points, with fine hairs ; on segment 2 is a blackish dorsal patch, and on either side are two small spots, and all these are furnished with hairs ; on 13 is a row of four small spots, and behind it one of two ; head a little broader than any segment, rounded, slightly bilobed, somewhat pilose ; color dark brown.

Nearly all the larvæ became lethargic immediately after leaving the egg, having first devoured the egg shells ; but a few, of a single brood in 1878, about ten per cent, fed and proceeded to first and subsequent moults. These gradually died off after first and second moults, but one lived several days after third, and died about 14th November. In the fall, the first moult was reached at about 18 days from the egg. The remaining larvæ were kept in a cool room, and such as survived were placed in the greenhouse 14th Jan., on violet, and began to pass first moult 11th Feb., or after 28 days.

AFTER FIRST MOULT—Length .15 inch ; thickest in middle ; color yellow-green, on dorsum mottled with brown, especially at bases of spines ; the spines, which in all the Argynnids make their first appearance at this stage, form six longitudinal rows of large spines, two of which may be described as dorsal and two as lateral, besides a row of very small spines along base of body, over the feet ; the dorsals begin at 2 and run to 13, one upon each segment, in each row ; the two laterals begin at 5, and the upper one stops at 12, the lower continuing to 13, always but one on each segment ; on either side of 2 are two minute tubercles with hairs, two also on 3, and three on 4 ; between 2 and 3 and between 3 and 4, at junction of the segments, is set a large spine which lies between the dorsal and first lateral row on each side ; (this arrangement of spines probably belongs to the entire genus, at least to all species whose caterpillars are known to me, and continues till last larval stage) ; spines long, tapering, black, beset with many short and fine black bristles ; the spines on second lateral row now rise from yellowish tubercles (but in some examples these spines were green and rose from greenish tubercles) ; all others from black ones ; head sub-cordate, black, with many short black hairs. To second moult in fall 5 to 7 days ; in spring from 14 to 24 days.

AFTER SECOND MOULT—Length .22 inch ; shape as at previous stage ; color black-brown, the sides less dark than dorsum ; the tubercles

of the dorsal spines are pale buff on outer side, but black on dorsal side ; the first laterals have black tubercles, and second laterals buff ; the intermediate tubercles on anterior segments are yellow ; the dorsal spines on 2 are somewhat turned forward, but are no longer than others of same rows ; head as before, except that on each vertex now appears a small conical black process. To third moult, in fall, 6 days ; in spring, 7 to 12 days.

AFTER THIRD MOULT—Length .3 inch ; color velvety-black with a brown tint ; the spines much longer and heavier than before ; the outer side of tubercles of the dorsal rows is now dull yellow ; the spines of first lateral row have very little yellow at base, and those of lower row are yellow at base and a little way up ; head sub-cordate, much flattened frontally, and on the summit of each vertex is a small sharp process as before ; many small tuberculations over the face, each of which sends out a black hair ; color of front head shining black, but the back is yellow. To next moult, in spring, 11 to 14 days.

AFTER FOURTH MOULT—Length .5 inch ; color as at previous stage ; spines black, both dorsals and first laterals very slightly colored reddish-yellow at base, scarcely visible except when viewed obliquely ; the lower laterals and also the intermediate spines on anterior segments are all orange at base and about half way up ; head as before, much flattened ; color black, orange at back. In some examples the bases of lower spines and the back of the head were reddish-yellow in the early part of this stage, but became orange later. To next and last moult 15 days.

AFTER FIFTH MOULT—Length .8 inch ; color velvety black ; the dorsal spines are drab at base, except those on 2 and 3, which are brownish-yellow ; all the spines of the two other rows are of same yellow at base, but the tubercles orange ; the back of head a yellow-orange. At about 20 days after the moult the larva reached maturity.

MATURE LARVA—Length 1.4 inch at rest, greatest breadth across middle of segment .3 inch ; length in motion 1.8 inch ; cylindrical, of even thickness from 5 to 11, the segments rounded ; color velvety-black ; the spines long, slender, tapering, of about equal length (the dorsals on middle segments measure .15 inch to tubercle, .16 to skin), the long spines on 2 are directed forward, but are not longer than others ; all the spines are beset with many short black bristles ; those of the dorsal rows are

translucent brown at base, except on 3 and 4, where they are dull yellow; all of the two lateral and the intermediate rows are dull yellow from base (including the tubercles) half way to top; tops of all spines and all the bristles black; feet and legs brown; head sub-cordate, deeply cleft, flattened in front; on each vertex a small conical process; over the front many short black hairs; color black, the back of head reddish-yellow, sometimes dull yellow. Twenty-four hours after suspension the larva pupated.

CHRYSA LIS—Length 1 inch, greatest breadth .3 inch; shape of *Diana*; cylindrical, a little compressed laterally, the wing cases prominent and flaring at the base on ventral side; the whole surface finely corrugated; head case square, bevelled at the sides, rounded transversely, the outline from top of mesonotum to extremity being arched; on either vertex a small conical process; mesonotum carinated, followed by a deep rounded excavation; on middle of either side of mesonotum a small conical tubercle; on the abdomen two dorsal rows of similar tubercles and a row of small ones on each side; the color varies somewhat, some examples being red-brown, irregularly mottled with black; on the wing cases red-brown and the black is limited mostly to the disk and nervures; others are drab and black, the wing cases finely streaked with black, otherwise drab; on the abdomen the front part of each segment is black, the rest drab, irregularly serrated at the junction. Duration of this stage 22 days.

(My larval descriptions are in all cases drawn shortly after the hatching or after the moult, say from 12 to 24 hours. In this period of the stage the colors are fresher than afterwards. Some larvae, as *Limenitis Arthemis*, change color essentially two or three days after some of the moults, and in all cases, as the next moult approaches, the skin loses its freshness and all color becomes dulled.)

I have received eggs of *Alcestis* several times, and in the years 1876, '77 and '78, from Mr. Worthington and Mr. Bean, the one at Chicago, the other at Galena. The females were shut up with plants of violet and laid abundantly, in September. I have stated above that some of the larvae in 1878 fed, after leaving the egg, and went on to second and one to even third moult, but that these all died on the approach of cold weather. I have known no other instance among our large Argynnids, *Diana*, *Idalia*, *Cybele*, *Aphrodite*, where the larvae proceeded to feed and moult the same

season in which they emerged from the egg, but invariably they have become lethargic forthwith.

The geographical limits of *Alcestis* are not yet determined. It seems to be abundant in northern Indiana and Illinois, and I have received it from Nebraska. The species is near *Aphrodite*, and may be distinguished by its deep red color in both sexes, and by the color of under surface. In the female this is wholly dark ferruginous on secondaries, from base to margin, or sometimes olive-black, like *Idalia*, and there is an absence of the band between the outer rows of silver spots; the male either very dark brown, or ferruginous-brown, from base to margin, without mottling of buff or drab as seen in *Aphrodite*. Sometimes there is a trace of the band, but it is always very slight, rather a showing of a light sub-color through the coating of brown than a band.

In CAN. ENT., vi., p. 124, 1874, I stated some facts which had puzzled me in the history of our larger Argynnids, namely, that at Coalburgh, while fresh examples of *Cybele* and *Diana* appeared about 1st to 20th June, no traces of eggs had been found in the females, after repeated dissections of *Cybele* between June and August; but that early in August the eggs become distinguishable and rapidly mature, and before last of that month are deposited, and from that on to first of October. Multitudes of fresh individuals appear in early August. There also seemed to be too short an interval between middle of June and last of July for the growth of the larvae and the chrysalis period, inasmuch as every stage was greatly prolonged in the spring, so that about four months intervened between hibernation and the butterfly, as I had treated the larvae. And I suggested that there might be irregularity in the emergence of the butterflies from the same lot of eggs laid in September, so that some few might appear in June and the rest in August. I now am of the opinion that there are two annual broods. The experience, in fall of 1878, with those larvae of *Alcestis* which proceeded to feed instead of going into lethargy, and passed two and three moults, within a very much shorter period than has been observed in the spring, showed that six weeks in midsummer might not improbably be long enough for all the changes. Perhaps also there are but four larval moults in the summer brood, as in some of the *Melitæas*, though there are five in the winter brood. Every stage would be shortened by the hot weather of July. On 14th June, 1878, I saw a pair of *Cybele* flying; in copulation. In all instances where this has happened with butterflies under my observation, and the females have been

secured, and this includes Arg. *Atlantis* (CAN. ENT., vii., p. 35, 1875) and *Myrina* (id. viii., p. 162, 1876), eggs have been laid within a few hours after. Mr. Siewers, at Newport, Ky., had twice observed pairs of *Cybele* in same condition in early summer. Eggs laid 15th June would allow about two months for the several stages to imago.

NOTE.—I received recently a letter from an active collector and breeder of butterflies, in which he says: "I would like to ask you why you call the segment back of the head, in your descriptions of larvæ, the second segment. Other authors, without a single exception, so far as I know, call it the first segment. By your calling it the second and numbering the other segments in accordance, your descriptions are apt to be misleading to those who are used to the descriptions of other authors."

This led me to look up the authorities and see if I was so unorthodox as my correspondent supposed. And first I examined Burmeister, Manual of Entomology, translated by Shuckard, London, 1836, a book to which I always go for directions and advice in things entomological. It is unnecessary to say that this author is *facile princeps* in his department. And on page 35, section 53, I read: "All larvæ with a perfect metamorphosis have a long, generally cylindrical body, composed of 13 more or less distinct rings or segments." "The head always occupies the first of the 13 segments." Next Westwood, whose Introduction, London, 1840, should be in the library of every working entomologist: "The larvæ (of lepidoptera) are long and cylindrical, composed of 13 segments, of which the anterior represents the head of the imago," vol. 2, page 319. Westwood in 1838, in his Entomologist's Text Book, London, page 397, has said: "They (the caterpillars) are composed of 13 rings, of which the first represents the head."

Looking over the larval descriptions in back volumes of the Entomologist's Monthly Magazine, the organ of the Ent. Soc. of London, I find all the writers, including such veterans in this branch as Gosse, Buckler and others, speak of the segments as 13, and count the head as number one. It would seem to be the rule with English entomologists. It is true Dr. Boisduval makes but 12 segments, not counting the head, but I apprehend the weight of authority is on the other side. It certainly is best that there should be uniformity in such a matter, if for no other reason, to prevent confusion such as my correspondent speaks of, and I think we cannot do better than to adopt the method of the German Burmeister, and our English brethren.

A FEW NOTES ON N. AMERICAN ACRIDII.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

I have long had upon my desk a partly completed revision of the Calliptenoid series of N. American Acridians. The task I have undertaken in the study of our fossil insects has hitherto prevented its completion; and as it bids fair to be long delayed, the following notes are published for the assistance of students of that special group, which is remarkably developed in the United States, from whence I have about one hundred species, while Europe scarcely possesses a dozen.

In a short paper on dimorphism in western Acridians,* I called attention to the long and short-winged forms in the species of this group. A few examples may be given: thus *Pezotettix plagosus* Scudd. and *Caloptenus Turnbulli* Thom. are to be referred to the same species; *Pezotettix abditum* Dodge and *Caloptenus junius* Dodge seem to belong together;† the same may be said of *Pezotettix nigrescens* Scudd. and *Melanoplus clypeatus* (*Caloptenus clypeatus* Scudd.); *Pezotettix Scudderi* Uhler resembles *Melanoplus glaucipes* Scudd. at a further remove; while not only is *Pezotettix enigma* Scudd. apparently merely a short-winged form of *Melanoplus collaris* Scudd., but *Pezotettix jucunda* Scudd. is perhaps only an impoverished form of the same, with still shorter tegmina.

It is rather remarkable that aside from the above, very few of our species have been twice named. A few synonyms, however, have occurred to me in addition to some already published. *Pezotettix ~~flavoannulatus~~* La Munyon, 1877, is *Pezotettix picta* Thomas, 1870; *Pezotettix borealis* Scudd., 1862, is *Pezotettix septentrionalis* Sauss., 1861; *Pezotettix tellustris* Scudd., 1877, is *Pezotettix Dawsoni* Scudd., 1875; *Pezotettix minutipennis* Thom. (Dec.), 1876, is *Pezotettix gracilis* Bruner (July) 1876; *Pezotettix viola* Thom. has been in my collection for years under the MSS. name *P. affiliatus* Uhl.; but Mr. Thomas's is the only published name.

Finally *Pezotettix obesa* Thom. must form the type of a new genus, for which the name of Bradynotes is proposed. It is most nearly allied

* Proc. Bost. Soc. Nat. Hist., xix., 336.

† Unless my memory is at fault, Mr. Dodge has independently reached the same conclusion concerning these two forms.

indeed to *Pezotettix*, but has some characters which ally it more closely to *Calliptenus* proper, and not a few points of general resemblance to *Ommatolampis*, although the structure of the tarsi is different. It is remarkable for the form of the sternal surface of the thorax, the obsolescence of the prosternal spine, the unarmed edge of the last dorsal abdominal segment of the ♂ and the great robustness of the body, especially of the ♀.

BRADYNOTES, nov. gen. The head is stout, rather broader below than above, the cheeks being full; the space between the upper edge of the mandibles and the lower border of the eye is equal to (♂) or rather less than (♀) the height of the eye; vertex between the eyes broad; front well rounded, not oblique, the frontal costa prominent, rather broad and sulcate; antennæ slender, equal, shorter than the hind femora. Thorax very stout, the pronotum very short, not covering the whole of the mesonotum, both front and hind borders straight, the posterior lobe only half as long as the anterior and rugulose, while the anterior lobe is smooth; lateral lobes separated from the dorsum by distinct rugæ; prosternal spine very much abbreviated, becoming in the ♀ a mere blunt tubercle, and in the ♂ very short and conical; mesostethium and metastethium together fully as broad as long, the metasternal lobes distant in the ♀, approximate in the ♂. Tegmina and wings altogether wanting. Hind femora small, moderately stout, reaching the tip of the abdomen in the ♂, but not in the ♀, the upper carina smooth; spines of hind tibiæ equal in both rows, the lateral edges of the tibiæ between them smooth and rounded; first hind tarsal joint perhaps a little longer than the last joint, but certainly shorter than the second and third joints together. Terminal abdominal joints of the abdomen of the ♀ short, making the tip blunt, as in the series of *Pezotettix* represented by *P. jucunda* Scudd.; abdomen of male upcurved apically, the last ventral segment being long; hinder edge of the last dorsal segment smooth and entire, unprovided with tubercles or prolongations as in *Pezotettix* and *Melanoplus*.

The only species known to me is *B. obesa* (*Pez. obesa* Thom.)

ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.—
The Annual Report of our Society has been issued and mailed to our members. Should any fail to receive their copies they will please communicate with the Editor or Secretary-Treasurer.

PRELIMINARY LIST OF NORTH AMERICAN SPECIES OF
CRAMBUS.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

CRAMBUS Fab.

- satrapellus* Zinck. in Germ. Mag. iv., 247; Zeller Mon., 16.
Hab. "Georgia." Florida (Schwarz).
- praefectellus* Zinck. in Germ. Mag. iv., 249; Zeller, Mon. 17; *involutellus*
Clem., Proc. A. N. S. Phil., 1860, 203.
Hab. Can., N. Y., Tex., Mass.
- quinqueareatus* Zell., Ex. Microlep. 38, T. 1, fig. 16.
Hab. "Texas."
- Leachellus* Zinck. Germ. Mag. iv., 114; ? *involutellus* Clem. Proc. A. N. S.
P. 1860, 203; Zeller, Mon. 18. ? *pulchellus* Zell., Mon. 18.
Hab. Vancouver Island, Texas, Maine, New York.
var. occidentalis Grote, Can. Ent., xii., 16.
Hab. San Francisco, Cal.
- Girardellus* Clem., Proc. A. N. S. Phil., 1860, 204; Zeller, Mon. 19.
Hab. N. Y., Ohio, Mass., Penn.
- sericinellus* Zell., Mon. 49.
Hab. Maine, N. Y., Mass., Ohio.
- floridus* Zell., Beitr. 1, 91.
Hab. "Mass."
- labradoriensis* Christ., Ent. Zeit. 19, 314; W. E. M. 4, 379.
Hab. "Labrador."
- agitatellus* Clem., Proc. A. N. S. P. 1860, 203; Zell., Mon. 21.
var. alboclavellus Schlaeger, Zell., Mon. 19.
Hab. Ohio, N. Y., Ill., Va., Mass., Tex.
- saltuellus* Zell., Mon. 22.
Hab. N. Y., Mass.
- bidens* Zell., Beitr. 1, 89.
Hab. N. Y., Mass.
- minimeilus* Rob., Ann. N. Y. Lyc. N. H., 11, 315.
Hab. Penn.
- argillaceus* Pack., Proc. B. S. N. H., 11, 32.
Hab. "Labrador."

- albellus* Clem. Proc. A. N. S. Phil., 1860, 204; Zell. Mon. 23.
Hab. Maine, Mass., N. Y., Penn.
- bipunctellus* Zell., Mon. 23; Rob.; Ann. N. Y. Lyc. N. H., 9, 316.
Hab. Ohio, Illinois, Penn., Can.
- laqueatellus* Clem., Proc. A. N. S. Phil., 1860, 203; Zell., Mon. 24.
Hab. Tex., Ill., Mass., N. Y., Ohio.
- topiarius* Zell., Sr. Ent. Zeit., 1866, 155; Grote, Can. Ent., 12, 17.
Hab. N. Y., Sierra Nev., Cal.
- Goodellianus* Grote, Can. Ent., 12, 17.
Hab. Mass., Penn.
- decorellus* Zinck., Germ. Mag. iv., 250; *polyactinellus* Kollar, Zell., Mon. 25; Beitr. 1, 92.
Hab. "Texas."
- plejadellus* Zinck., Germ. Mag. iv., 251; Zell., Mon. 26.
Hab. "Georgia."
- teterellus* Zinck., Germ. Mag. iv., 252; *camurellus* Clem., P. A. N. S. Phil., 1860, 203; *terrellus* Zell., Mon. 27.
Hab. Georgia, Texas, Ohio.
- elegans* Clem., Proc. A. N. S. Phil., 1860, 204; *terminellus* Zell., Mon. 27;
Ex. Microlep. 45.
Hab. Ohio, N. Y., Penn., Tex.
- oregonicus* Grote, Can. Ent., 11, 17; N. Am. Ent., 1, 68, pl. 5, fig. 9.
Hab. Oregon.
- trichostomus* Christ., Ent. Zeit., 1858, 313 W. E. M., 4, 379.
Hab. Labrador!
- interruptus* Grote, Can. Ent., 9, 101; C. E., 11, 15.
Hab. Can., Maine.
- dissectus* Grote, Can. Ent., 9, 16; N. Am. Ent., 1, 68, plate 5, fig. 8.
Hab. Maine, N. Y.
- unistriatellus* Pack., Proc. B. S. N. H., 11, 32; *exesus* Grote, Can. Ent., 11, 16; N. Am. Ent., 1, 68, pl. 5, fig. 7.
Hab. Maine, N. Y., Penn., Labr.
- exsiccatu*s Zell., Mon. 37.
Hab. Maine, N. Y., Ill., Vancouver.
- anceps* Grote, Can. Ent., 11, 18.
Hab. San Francisco, Cal.
- laciniellus* Grote, Can. Ent., 11, 18.
Hab. Maine.

caliginosellus Clem., Proc. A. N. S. Phil., 1860, 203.

Hab. N. Y.

duplicatus, n. s.

♀. Head, thorax and fore wings obscure clayey yellow. Hind wings and abdomen rather dark fuscous. Fore wings crossed by two *double* angulated brown lines, hence differing from *caliginosellus*, where the lines are single, and the ground color is different. Beneath brownish fuscous, palpi at the sides brownish. The surfaces of primaries above show scattered dark scales about the disc and at base; a fine brown terminal line; fringes fuscous, pale at base. *Expanse* 20 mil.; N. Y., June 23, W. W. Hill, coll.

fuscicostellus Zell., Mon. 44; ? *mutabilis* Clem. P. A. N. S. P., 1860, 204.

Hab. Fla., Tex., N. Y., Ohio, Ill.

attenuatus Grote, Can. Ent., 11, 18.

Hab. Vancouver Island.

hemiochrellus Zell., Ex. Microlep., 49.

Hab. "Texas."

ruricoellus Zell., Mon. 40.

Hab. N. Y., Penn., Ohio, Ill., Me.

vulgivagellus Clem., Proc. A. N. S. Phil., 1860, 203; *chalybistrostris* Zell., Mon. 40.

Hab. N. Y., Penn., Ohio, Ill., Me., Vancouver.

luteolellus Clem., Proc. A. N. S. Phil., 1860, 203.

Hab. ?

s. g. *Propexus* Gr.

cdonis Grote, Can. Ent., 11, 19; N. Am. Ent., 1, 68, plate 5, fig. 11.

Hab. Kansas.

pexellus Kaden, Zell., Mon. 48.

Hab. Texas, Col.

pectinifer Zeller, Exot. Microlep., 51, pl. 1, fig. 20 a, b.

Hab. "Texas."

repandus, n. s.

♂. Antennæ with a single outer row of short teeth, obsolete at base, continued to tips. The stem is outwardly pure white. The teeth increase very slightly in size towards the middle and taper very gradually; they are ciliated. Whitish. Fine dark brown lines run along the interspaces. At the extremity of cell an acutely angled broken line; the longitudinal lines on cell and

submedian space are nearly black. The exterior, not angulated, transverse line is broken into brown marks nearly continuous, and followed by a whitish shade. A fine black, partly dotted, terminal hair line; fringes silver at base, else whitish interrupted with brown. Palpi outwardly brownish; head and thorax whitish, more or less brown tinged. Hind wings slightly soiled with white fringes. *Expanse* 32 mil. Colorado, Mr. Hulst. This species differs from *pectinifer* in the shorter antennal teeth, the white scales on the stem, and in the bleached fore wings with their fine dark longitudinal hair-lines, together with the silver base of the fringes.

In making out this List I have omitted references to the British Museum, where undoubtedly many of our species are represented under different names. I am obliged to Prof. Fernald for sending me specimens of Dr. Packard's species, whose paper I had overlooked.

Prof. Zeller's excellent monograph should have priority over Walker's compilation in the B. M. Lists, not only on account of its merits, but because there is evidence of its issue as early at least as March, 1863. A separate edition was afterwards printed in July, 1863.

NOTE.—Since writing the above List I am indebted to Prof. Fernald for the identification of *Crambus inornatellus* Clem., Proc. Ent. Soc. Phil., 2, 418, March, 1864. It is a synonym of *sericinellus* Zeller, 1863, and should be added to the synonymy given above.

CORRESPONDENCE.

The paper on three new species of *Botis* in the February number was issued without my seeing the proof. I had, subsequently to writing the paper, discovered that *dissectalis* was a fresh and bright specimen of my *submedialis*, CAN. ENT., 8, 111. The ringlet in submedian space is so obliterate as to allow only its traces to be made out on very close inspection. With this exception the description last published is naturally the best, as my type of *submedialis* is somewhat faded and worn. The species may be quickly known by the dark under surface, broken by pale spots, the squarely produced fascia on secondaries above, the three open ringlets on the yellow primaries, with their discoloured fuscous fringes, and the vague fuscous subterminal shade diffuse subcostally on both pair of wings. The species may be known as *submedialis*, with *dissectalis* as a synonym.

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