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The Canadian Entomologist.

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LONDON, OCTOBER, 1889.

No. 10.

THE ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the lecture room of the new Biological Building of the University of Toronto, on Tuesday, September 3rd, 1889. The President, Mr. James Fletcher, of Ottawa, took the chair at 11 o'clock a.m. The following members were present:—Mr. E. Baynes Reed and Mr. J. M. Denton, London; Mr. J. Alston Moffat, Hamilton; Dr. Brodie, Dr. White, Masters O. and W. White, M., Gamble Geddes, Mr. A. Blue (Department of Agriculture), Toronto; Rev. C. J. S. Bethune, Port Hope; Mr. W. H. Harrington and Mr. R. Bell, Ottawa; Mr. H. H. Lyman, Montreal; Rev. T. W. Fyles, Quebec; Rev. W. A. Burman, Winnipeg; Mr. L. O. Howard, Assistant Entomologist, Department of Agriculture, Washington.

The minutes of the previous meeting having been printed and circulated among the members, reading of them was dispensed with, and they were duly confirmed.

The President then delivered his annual address, in which he referred especially to the chief insect attacks of the year. It will be printed in full in the Annual Report of the Society. A cordial vote of thanks for his able and interesting address was unanimously voted to the President on motion of Dr. Bethune, seconded by Mr. Reed.

In the discussion which followed Dr. Brodie stated that he had found several cereals injured by Thrips; he discovered what were probably the larvæ of Thrips feeding under the sheath on culms of grass, but when kept over night no specimens would be found in the morning. He and Professor Wright had examined the insects and came to the conclusion that they were Thrips. The larvæ were exceedingly difficult to mount for the microscope; if preserved in balsam they soon faded out and became useless, but better results followed the use of glycerine. He was satisfied that there are two broods in the year, the first being early in the season. This year, owing to dry weather, they were very abundant

in waste places, and he found about one-half of the timothy destroyed by them; after the rain set in the injury was very much reduced.

Mr. Geddes spoke of some variations in size that he had observed in the common yellow butterfly, *Colias philodice*, and expressed his opinion that the large specimens fed on clover and the small on lucerne.

Mr. Howard (of Washington) gave an account of the success which has attended the efforts of Dr. Riley and himself to introduce parasites of the Fluted-Scale insect (*Icerya purchasi* Maskell), a very destructive creature in California. This noxious insect had appeared very suddenly in the State, from where no one knew. Experiments were made upon it, and remedies proposed, but the cultivators did not seem to care to make use of them on their plantations. They then set to work to learn its life-history, and soon found that it came from Australia. They corresponded with Mr. Percy Crawford regarding it; he found the insect in Australia, but it was not at all abundant; they concluded, therefore, that it was kept in check by parasites. A dipterous parasite was found by Mr. Crawford. Their next proceeding was to send Mr. Koebele to Australia. He found the insect everywhere, and observed that it was very commonly parasitized. He then sent over about 15,000 living specimens of parasites; these were liberated at Los Angeles. He also found a "Lady-bird" (*Coccinella*) feeding on the scale-insect, and sent several thousand of them. The result has not been satisfactory with the dipterous parasite, as it breeds too slowly, but one of the species of Lady-birds breeds most rapidly, and will no doubt keep the pest within due bounds. As an instance of this he mentioned that 400 Lady-birds were sent to one planter, Colonel Robins, in May last; he thought from their satisfactory work that his orchard would be free from the pest by the close of the summer, but he afterwards wrote to say that on the 15th of August there was not one living scale-insect left. The experiment had been entirely successful. Mr. Howard also referred to the importation of the parasites in 1883 of the cabbage-butterfly, *Pieris rapæ*.

Dr. Bethune gave an account of his attempt to import from England many years ago the parasites of the wheat midge, and of the failure of the effort.

Dr. Brodie was strongly of opinion that noxious insects should be fought by means of parasites; that this was the true scientific method,

and that the use of poisons was a grave mistake. He was very much gratified with the account of the methods adopted at Washington, and hoped that they would be developed to the utmost.

Mr. Fletcher, in reply, said that we could not possibly ignore the great value of poisons as remedies against noxious insects; that it was absolutely necessary to use them until we can depend upon the parasites; and that even if we had the parasites at work upon our destructive insects they might at any time be swept away through a mildew or blight, and we should be left at the mercy of the enemy. He had been in correspondence with Mr. Whitehead in England in order to procure the parasite of *Diplosis*, but unfortunately this gentleman was ill and unable to carry out the project. He had found nearly all the specimens of scale-insects (*Aspidiotus*) sent to him from British Columbia were parasitized, but had never found one affected in this way in Ontario.

Dr. Brodie thought that the farming community could never be brought to adopt scientific methods for the protection of their crops till they had suffered from a sweeping destruction. He referred, as an example, to the ravages of the wheat midge some years ago. In the County of York it wrought so much havoc that the wheat fields were deserted and left to the cattle; a day's threshing would produce two bushels of midges and no grain. When their crops were all destroyed then they were willing to resort to remedies, chief among which were the employment of the "midge-proof wheat" for seed, a judicious rotation of crops, and planting too early or too late to suit the habits of the midge. The introduction of new varieties of wheat was the principal means of getting rid of the pest. He wished that the farmers might lose all their potatoes in order that they might be led by this severe lesson to give up the use of Paris green and adopt scientific means of saving their crops.

After some further discussion, in the course of which the value of various poisons, such as arsenical preparations, hellebore, kerosene, etc., in checking insect ravages was insisted upon, the subject dropped.

Dr. White exhibited to the meeting some cheap wood cuts in outline of botanical subjects that were used in illustration of popular articles in "School Work and Play," and recommended that something similar should be done in order to popularise entomology. He said that specimens were first photographed upon zinc plates instead of glass, and, in

this way, by a special process, blocks were prepared for the printer at a very trifling expense. The project was heartily approved of, and it was agreed on all sides that much valuable instruction might be disseminated in this way.

Mr. Burman related his experience of injury to cattle and dogs by flies in the Northwest, and asked whether fish-oil would be a remedy. In reply, Mr. Fletcher and Mr. Howard stated that fish and other oils and grease were effective, both in keeping off the flies and in healing the affected parts.

The meeting then adjourned till the afternoon.

AFTERNOON SESSION.

The report of the council, the audited financial statement of the Secretary-Treasurer, and the report of the Librarian were presented and read to the meeting, and, on motion, were duly discussed and adopted. Mr. Moffat spoke of the large amount of work and the great care which Mr. Reed had bestowed upon the library during many years past, and of the excellent position into which it was now brought. He moved that "The thanks of the Society be given to Mr. Reed for his services in the library, and that the Executive Committee be hereby recommended to consider the possibility of shewing, in some pecuniary way, their recognition of his labors." Mr. Geddes, in seconding the resolution, which was duly carried, referred in warm terms to Mr. Reed's efficiency and kindness in connection with the library. It was suggested, in the discussion that followed, that a catalogue of the books should be prepared, and that by-laws should be framed for the proper regulation of the library and the issue of books to members of the Society. Mr. Denton said that there were now about eleven hundred volumes in the library, many of them being very rare works on entomology and other departments of science; he thought it most desirable that members out of London should be enabled to know what books there were, and under what conditions they might borrow them. Dr. Brodie spoke of the great importance of having a complete catalogue made of all the libraries in Ontario, and said that he considered it a work that might very well be undertaken by the Provincial Government. Mr. Reed thought that we were still in too crude a state to publish a catalogue of the Society's Library, but we might

make a beginning by issuing lists of the books in its different departments. It was finally agreed to leave the matter in the hands of the Librarian.

Mr. Lyman read his report as delegate to the Royal Society of Canada. Mr. Reed, in reply to an enquiry, gave an account of what had been done during the past year with regard to the Society's rooms and collections; he stated that they had frequently been opened to the public, and that many very pleasant evenings had been spent among the microscopes, books and cabinets.

Mr. Reed drew the attention of the meeting to the changes in "The Agricultural and Arts Act," affecting the Society, made during the last session of the Ontario Legislature, and moved, seconded by Dr. Bethune, "That in accordance with the provisions of section 67 of the Agricultural and Arts Act, as amended in 1889, the agricultural divisions in Schedule A of the said Act be grouped into the following five divisions, for the purpose of electing one person from each of said five divisions (who shall be a resident of the district he represents) as directors of the Entomological Society of Ontario:—

Division 1,	to comprise	Agricultural Divisions	1, 2, 3.		
"	2,	"	"	"	4, 5, 13.
"	3,	"	"	"	6, 10.
"	4,	"	"	"	7, 8, 9.
"	5,	"	"	"	11, 12.

And that this grouping of the Divisions be in force until otherwise altered or re-arranged at any annual meeting of the Society."—*Carried.*

The following gentlemen were elected officers for the ensuing year:—

President—Rev. C. J. S. Bethune, M. A., D. C. L., Port Hope.

Vice-President—E. Baynes Reed, London.

Secretary-Treasurer—W. E. Saunders, London.

Librarian—E. Baynes Reed, London.

Curator—Rowland Hill, London.

Directors—Division 1—W. H. Harrington, Ottawa.

" 2—J. D. Evans, Sudbury.

" 3—Gamble Geddes, Toronto.

" 4—J. Alston Moffat, Hamilton.

" 5—J. M. Denton, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. Dr. Bethune, Port Hope.

Editing Committee—James Fletcher, Ottawa ; J. M. Denton, London ; Rev. T. W. Fyles, Quebec ; Dr. Brodie, Toronto.

Delegate to the Royal Society of Canada.—H. H. Lyman, Montreal.

Auditors—J. M. Denton and E. B. Reed.

Mr. Moffat, who had been engaged for some time past in re-arranging the Society's collections, spoke of the desirability of printing a new list of Lepidoptera for labelling purposes. Dr. Bethune said that he did not think it advisable to do so just now, as the nomenclature of the order must be considered to be in a somewhat transition state ; he thought that after Mr. Scudder's magnificent work on the butterflies was completed, and students had time to master its contents, there would be a very general adoption of many, at any rate, of his generic titles, and that this would alter very much our current nomenclature. He also referred to Prof. J. B. Smith's contemplated monograph of the Noctuidæ, the frequent descriptions of new species by Mr. Hulst and others, and the work of Prof. Fernald among the Micros, as rendering the publication of a list premature at present. He said that he had in his possession a new check-list of the Noctuidæ by Mr. Grote, but its publication was deemed unwise owing to the foregoing considerations. He thought that Mr. Moffat's object could be met by printing a few sheets to supplement the lists published a few years ago by Dr. Brodie and Dr. White.

Papers were then read by (1) Dr. Brodie, on "Gall Insects ;" (2) the Rev. T. W. Fyles, "Some notes on the Effects of Heat on Insect Life ;" (3) Dr. Goding, "In Memoriam : George John Bowles." These papers will be published in full in the Annual Report.

The Rev. W. A. Burman, of Winnipeg, was elected a member.

After spending some time in the examination and discussion of various specimens brought by members, the meeting adjourned to meet in London next year.

ERRATUM.—In the description of the larva of *Grapta j-album*, by Mr. P. M. Dawson, in the September number, there occurs the obvious mistake (page 180, line 12) of "eight inches long" instead of ".8 inch."

A NEW CLOTHES BEETLE.

BY PROF. A. J. COOK, AGRICULTURAL COLLEGE, MICHIGAN.

One of the most interesting studies of the scientific entomologist—more interesting because of its economic importance—relates to variation of habits of insects, consequent upon variation in their environment. The carpet beetle, *Anthrenus scrophulariæ* Linn., feeds on flowers in its native Europe. In the new atmosphere of America, it feeds and thrives upon carpets, shawls and other woollen goods. The apple maggot, *Trypeta pomonella*, feeds upon our wild haw and other wild fruits. Civilization exterminates its old-time aliment; and it betakes itself to our apples, cherries and plums. The curculio, apple-tree borers, bark lice, etc., are other illustrations of the same truth.

In the past season I have discovered another illustration in the *Lasioderma serricorne* Fab. This insect belongs to the family *Ptinidæ*, a small family of very small insects. Very few of the insects of this family are noxious; the two best known of which are, the apple-tree twig bore, *Amphicerus bicaudatus* Say., which bores in the mature state in the twigs of the apple, and *Lincoxylon basilare* Say, which attacks the hickory and grape. The insect in question, *Lasioderma serricorne* Fab., has been found to attack plush furniture. The larvæ, in this case, do the mischief; they perforate the plush, making it like a sieve. I know of several pieces of uphoistered furniture utterly ruined by these minute larvæ.

The beetle is light-brown in color. There is little variation in the color, except that the eyes and tips of the elytra are black. The wing-covers appear a little lighter, because of a covering of light hairs, which are more dense on the elytra than on the thorax and head. The thorax bends down, so that, as we look from above, we can not see the head. The serrate antennæ, which give its name to the beetle, are also bent under the head, so as to rarely show. The beetle is very small, hardly more than 2 m.m. long. The elytra are non-striated. The first two joints of the antennæ are small. They then increase to the sixth, and then decrease to the end. The tenth, or last joint, is rounded. The grubs are short, curled and hairy. They are two m.m. long and one thick. The color is white, and the hairs nearly white. These latter have a slightly yellowish tinge. The six thoracic legs are tipped with black. The upper part of the head shows four yellowish-brown lines. The upper ones are

narrowest, while the lateral ones are abbreviated behind. The front of the head is brown, while the jaws and other mouth parts are nearly black.

Like all insects, these beetles, both as larvæ and imago, are very susceptible to gasoline or bi-sulphide of carbon. Both of these, used in large quantities, were quickly fatal to the insects. Like the carpet beetle, they infest upholstered furniture between the folds, especially where the back joins the seat. It is easy to drench such parts of a sofa or chair with gasoline and destroy the larvæ of either moth or beetle.

Nearly every year brings examples of such change of habits as described above. Such incursions, present and prospective, emphasize the importance of thoroughly-trained entomologists in every state of our country.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA.

(*Third Paper.*)

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

Tribe *Agrotini*.

The tibiæ are usually all spinose, the eyes naked, the body untufted, the form normal, the male antennæ of various structure, pectinated, brush-like, simple. The European species are referred by Lederer all to one genus, *Agrotis* of Hübner. Nevertheless, I think the yellow-winged forms may well be separated under *Hiria* and *Tryphæna*. Of these yellow-winged forms, with flattened abdomen, we have only one *T. Chardinyi*, from Anticosti and Maine, considered identical with the Siberian species of the same name, described originally by Boisduval under *Anarta*. For the structure of *Agrotis*, I refer the student to a paper of mine on the genus, CAN. ENT., XV., 51. This genus seems of general distribution, although, perhaps, most numerous represented by species in North America. To this tribe, I would refer certain American genera, with few species, which seem peculiar. These are: *Carneades*, which differs by a frontal tubercle; *Richia*, which resembles *Ammoconia* in having a thoracic rigid tuft, but has simple antennæ; *Adita*, with a claw on front tibiæ; *Agrotiphila*, with narrowed eyes; *Anytus*, with lashes; the peculiar genus *Ufeus*, and, finally, *Copablepharon*, which has some

resemblances to the *Heliolithians*, and superficially recalls *Arsilonche*. The position of some of these genera is debatable, and the immature stages almost entirely unknown. We may briefly compare the European and American representatives of *Agrotis*. In Europe, about 120 species are known; we have a preliminary list of over 200. Divisions of the genus into groups have been proposed on peculiarities of the genitalia, which seem convenient, but are probably of less importance than the armature; hence, I would prefer to divide the genus, primarily, into two groups, the species with unarmed fore-tibiæ, and those with all the tibiæ armed. When all the species are compared, there will probably be found peculiarities in the armature of the front tibiæ to warrant further divisions. The relationship of the American species to the European is evidenced by the identical forms, *i. e.*, *baja*, *ypsilon*, *plecta*, *sancia*, etc., then by the representative forms, *i. e.* *haruspica*, *phyllophora*, etc. The species from the west coast have largely a European facies; the Labrador species are found, with other Arctic forms, on the summit of Mount Washington. We may regard this genus as of very general, pre-glacial distribution; but evidently a greater number of species feed, in the larval condition, upon plants now found in temperate latitudes. Setting the question of the allied genera with mostly few species aside, the affinity of the two faunæ is quite evident. It is a little singular that the yellow-winged forms are so feebly represented in North America. Their presence gives a somewhat peculiar aspect to the European fauna. The occurrence of yellow-winged species is not unusual in the *Noctuidæ*. We find them in *Onco-cnemis*, *Hadena* and *Anarta* among usually fuscous species.

Tribe *Hadenini*.

Leaving the *Dicopid* genera, which seem peculiar, we now come to a group of typical Owlet moths, which differ from the *Agrotini* mainly in their usually unarmed tibiæ and tufted, rougher, body covering. In the first genera, the eyes are hairy; in *Fishia*, the tibiæ are spinose; in *Copimamestra*, the front tibiæ have a claw. This latter genus is founded for the European *brassicæ* and its American representative *occidentæ*. *Mamestra* is a typical Hadenoid genus with hairy eyes, and *Dianthæcia* merely differs by the external ovipositor. These two genera, or generic groups in our fauna, show a similar relation to the European fauna as with *Agrotis*. Whether our *trifolii* (*albifusa*) is identical with the European, may not be certain, but the genus has several representative species

such as *nimbosa*, *atlantica*, *subjuncta*, etc. In *Dianthæcia*, we have *D. bella*, which represents the European *D. Maguolii*. America has the usual preponderance of species, over seventy, while Europe has fifty-eight of the two together. In my lists I have not separated the forms of *Dianthæcia*, partly because the character was not easy to verify, or I had only males, while the pupa, which presents some peculiarities as studied in Europe, is quite unknown. Peculiar American Hadenoid genera, with hairy eyes, seem to be *Nephelodes*, *Admetovis*, *Tricholita*, *Trichoclea*, *Trichopolia* and *Eupsephopætes*.

I would here draw attention to the fact, that the generic characters in the *Noctuidæ* and the moths generally are of such a nature that a difference of opinion may legitimately arise. Undoubtedly, an ultimate and better opinion may be obtained, but criticism is to be only indulged in with that moderation which the nature of the subject demands. Far different is it with matters concerning positive or actual structure, where the empiric has before him a certain specimen under the microscope. In such cases, as with the genus *Cerathosia*, where the describer erroneously describes the neuration or other actual features, a positive error is committed and the author earns that measure of opprobrium which belongs to defective work in Natural History.

The European Hadenoid genera, with naked and lashed eyes, *Episema*, *Thecophora* and *Dichonia* seem to be absent from our fauna. *Polia*, which has the antennæ tufted at base and usually pectinate or serrated in the males, has eleven European species; in the Bull. U. S. Geol. Surv., VI., 266, I have given the list of ten American forms referred here, whether they are all strictly correct, I am uncertain. The European genera, with few species, *Metopoceras*, *Cladocera*,⁵ *Heliophobus*, *Ulochlena*, *Oxytryphia*, are yet without described American species. Gueneé's *Chariptera festu* seems to be the *Cerma cora* of Hübner, and not to be congeneric with the European *viridana*. Mr. Morrison's *Valeria Grotei* has a claw on the fore tibiæ; consequently is not congeneric with the European *jaspidca*, but seems to be allied to *Dicopsis*.

The genus *Oncocnemis* is a smooth, almost Agrotid form, considered by Herrich-Schaeffer as allied to *Heliothis* with a claw on the front tibiæ, represented by two Russian species, of which *confusa* has a representative form in the Californian *Behrensi*. I have described the large number of nineteen American species (three having yellow secondaries, *Hayesi*,

Dayi and *mirificalis*), while other authors have added four; our most beautiful Eastern form being the *atrifasciata* of Mr. Morrison, which I refer to this genus, it being related apparently to the grey forms, such as *Chandleri*, *riparia*, etc., the median space filled with black. I refer two Western species to the European genus *Valeria*, *opina* and *conserta*, and one Eastern species, *stigmata*, to the European genus *Dryobota*. Peculiar American Hadenoid genera, with naked eyes, seem to be *Arthrochlora*, *Hillia*, *Homohadena*, *Pachypolia* and *Hadenella*. The typical genus, *Hadena* itself, seems to have a parallel representation in North America with the other leading genera *Apatela*, *Agrotis* and *Mamestra*, from which latter genus the species differ in having naked eyes. It offers both identical and representative species with the European forms, and again an excess in number, over sixty to over forty. The related genus *Hyppa* with its one European species has a representative American form *xylinoidea*. I have identified the European *Dipterygia pinastri* as occurring in North America; whether this is a survival, or a more recent importation, is doubtful, perhaps the latter. Of the European genus *Actinotia*, we have two species; of *Callopietria*, one. A strong analogy of the two faunæ is offered by the genera clustering about *Euplexia*, the single species of which latter, *lucipara*, is found from the East to California, and is apparently an unchanged survival and identical with the European: I have found the larvæ on a number of plants, among them the common *Fuchsia*. These genera are *Trigonophora*, and *Brotolomia*, each with representative American forms, while the European genus *Habryntis* is perhaps not found in America, nor, conversely, the American genus *Conservula* in Europe. *Prodenia*, which has one European, has at least four North American species. This genus is a Southern form, intruding into the European fauna from the Mediterranean and Asia Minor; in America, more plentiful in the Southern States, where an allied form, the *Laphygma frugiperda* of Abbot and Smith, is destructive to corn. We have nothing like the wide-winged European *Mania maura*, so far as my knowledge goes. The determination of what species is the real type of the earlier genera of Ochsenheimer and other authors is a matter of some difficulty, owing to the fact that the species were loosely associated, and the characters we today consider of importance neglected. Not a single species included by Boisduval in 1829 under *Luperina* is placed under *Luperina* by Lederer. The true type of *Luperina* may, I think, be considered to be the Euro-

pean *testacea*, which Lederer includes under *Apamea* Tr. Probably the true type of *Apamea* may be found in *nictitans*, one of the original species.

Of neither *Luperina* Boisd. (= *Apamea* Led.), or *Ledereria* n. (= *Luperina* Led. non Boisd.), do I know American species. *Apamea nictitans* occurs with us however, from California to the East probably as an unchanged survival, not only in the typical, but also in the varietal European forms. Whether *nictitans* and certain allied species are distinct from *Gortyna*, I, however, doubt, and it is probable that we have but one genus which European authors call *Hydracia* Guen. Now the type of *Hydracia* is *micacea*, as cited in the Species Général. But the type of *Gortyna* is already designated by Hübner as *micacea*, consequently *Hydracia* must fall. For *Gortyna* Led., with its one species *flavago*, which differs from *Hydracia* by its mucronate clypeus, the term *Ochria* must be used, as I have pointed out. The objectors to Hübner must be told that Ochsenheimer cites him as authority, himself giving no diagnoses to the Noctuid genera; that the older Noctuid generic names are all incompletely founded, that there is no standard for exact generic definition, and finally, that Hübner has given us more information and a better classification for the *Noctuidæ* than any author before his time. Hübner separates the *Thyatirine* correctly for the first time; he is the author of the leading generic divisions and names, *Apatela*, *Agrotis*, *Heliolithis*, etc., names which have been wrongly credited to his successors. The North American species of *Gortyna* (including those separated by me with *nictitans*) are much more numerous than the European. The finest species is our beautiful *Gortyna speciosissima*. We have two species with mucronate clypeus; one from the East, *buffalocensis*, and another from the West. In ornamentation these species resemble the other *Gortynæ*, but we must refer them to *Ochria*, together with the European *flavago*. Our North American species which most nearly resembles the European *flavago*, is, however, my *Cataphracta*, but here the front is smooth. The question then arises as to the value of the frontal tubercle; whether it may not be developed as easily as modifications in the color or pattern of ornamentation. Such questions are beyond our present ability to answer. We must use what characters we find upon which to found our genera, but the difficulties which the subject presents should preclude all notion that our present opinions are infallible, or that we have any reasonable pretext to arrogate to ourselves a superiority in our classi-

fication which allows us to speak unduly and depreciatingly of those who studied these matters long ago.

As with former groups, the North American *Hadenini* show a prevailing affinity with the European fauna. The amount of divergence can hardly be shown until all the species are carefully compared, but we can be sure it will not outweigh the resemblance.

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

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

(Continued from page 175.)

Sub-Family ARCTIINÆ.

In the previous paper I explained the sense in which this term is used, and nothing further in the way of definition need be said on that head.

Genus CROCOTA Hbn.

1816—*Verzeichniss*; Samml., Eur. Schm., III., 254.

This genus is in a sad state. It is almost impossible to identify species satisfactorily, and yet new species are constantly described. The matter has been further confused by Mr. Grote's persistent refusal to refer to Mr. Reakirt's species, for without referring them positively as synonyms to any species, he says he cannot believe that they refer to species different from those recognized by him, and therefore he ignores them altogether. This has had the effect of causing others to lose track of the descriptions which, poor as they may be, yet are necessary to be referred to. We know nothing at all as yet as to the range of variation in the genus, and species are based upon the most indefinite comparative features of colour and appearance.

Using *C. ferruginosa* as subject: The head is free, rather small; eyes large, somewhat prominent; ocelli distinct; vestiture scaly, smooth; antennæ of male with the joints marked, scarcely serrate, with fine lateral cilia, palpi moderate in length, straight or slightly drooping. Thoracic vestiture scaly. Legs closely scaled, posterior longest, the spurs normal—*i. e.*, middle with one, posterior with two pairs. The tongue is rather short, but corneous and spiral. Wings proportionately wide and short,

rather frail and thinly scaled, usually some shade of reddish or yellowish, more rarely tending to black. On the primaries, veins 7 to 10 inclusive are on a stalk out of the end of the cell, 10 thus not arising out of the subcostal, 3, 4 and 5 are almost equidistant from the end of the median. On the secondaries, 3 and 4 are from the end of the cell, 5 is wanting, 6 and 7 from a stalk out of the end of the subcostal, 8 from subcostal, about one-third from base. There may be some variation in the origin of 2, 6 and 7 of secondaries, and 5 may be present in some species; these are variable points in this family.

From what I have seen, I believe that almost any good local collection would show most of the species; in other words, I believe individual characters have been largely used for specific distinction.

C. aurantiaca Hbn.

1825—Hübner, Zutr., p. 9, ff. 411, 412, *Eubaphe*.

1855—Wlk., C. B. Mus. Lep. Het., II., 523, *Eubaphe*.

1862—Morris, Synopsis, 253, *Eubaphe*.

1864—Pack., Proc. Ent. Soc., Phil., III., 103, *Crocota*.

Habitat—"Georgia." Eastern and Middle States.

Packard apparently did not recognize this species. I am not sure that I have it correctly, but what I take to be the species seems to occur east of the Mississippi and north of the Carolinas.

C. belfragei Stretch.

1885—Stretch, Ent. Amer., I., 103, *Crocota*.

Habitat—Texas.

C. brevicornis Wlk.

1855—Wlk., C. B. Mus. Lep. Het., II., 536, *Crocota*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 542, *Crocota*.

1862—Morris, Synopsis, 255, *Crocota*.

1862—Clem. in App. to Morris' Syn., 308, *Crocota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 104 *Crocota*.

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe*.

Habitat—Can., Maine, N. Y., Mass., Ohio, Ills., Colo.

Apparently quite widely distributed. Butler says Walker had several specimens of this species among his *rubicundaria*.

C. costata Stretch.

1885—Str., Ent. Amer., I., 103, *Crocota*.

Habitat—Texas.

Apparently a very distinct species, which I have identified in the National Museum collection.

C. diminutiva Graef.

1887—Graef, Ent. Amer., III., 42, *Crocota*.

Habitat—Texas.

C. ferruginosa Walker.

1855—Walk.,* C. B. Mus. Lep. Het., II., 535, *Crocota*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 542, *Crocota*.

1862—Morris, Synopsis, 255, *Crocota*.

1862—Clem., in Morris Syn., App., 308, *Crocota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 103, *Crocota*.

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota*.

1868—Bethune, CAN. ENT., I., 18, *Crocota*.

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe*.

aurantiaca † Harris.

1850—Harris in Ag. Lake Super., 393, *Eubaphe*.

1864—Pack., Proc. Ent. Soc., Phil., III., 103, pr. syn.

rubicundaria † Walker.

1855—Wlk., C. B. Mus., Lep. Het., II., 536, *Crocota*.

1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. syn.

Habitat—Canada to N. Y., west to the Mississippi, Lake Superior,
H. B. Terr., Maine.

The distribution is probably wider. It is quite uncertain what this species really is, and authors are not agreed. Butler says one specimen of Walker's *rubicundaria* is referable here.

C. fragilis Strk.

1879—Rept. Engin., 1878-79, V., p. 1859, *Crocota*.

Habitat—"Pagosa Springs," July 21.

This is almost certainly *Ameria unicolor*, if Mr. Strecker's description is good for anything.

C. immaculata Reak.

1864—Reak., Proc. Ent. Soc., Phil., II., 372, *Crocota*.

Habitat—Philadelphia, Pa.

*This sign, whenever used with a reference, as above, indicates that the early stages were referred to.

So far as I know this species has not been positively identified with any other.

C. intermedia Graef.

1887—Graef, Ent. Amer., III., 42, *Crocota*.

Habitat—Texas.

C. leta Bdv.

1829—Bdv. in Guer. Icon. Ins., pl. 88, f. 6, p. 519, *Lithosia*.

1855—Walker, C. B. Mus. Lep. Het., II., 537, *Crocota*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 537, *Crocota*.

1862—Clem. in App. to Morris, Syn., 309, *Crocota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 105, = *brevicornis*.

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe*.

treatii Grote.

1865—Grt., Proc. Ent. Soc., Phil., IV., 322.

1882—Grt., New List 15, ? = *treatii*.

Habitat—Mass., N. Y., N. J., D. C.

I have in some way mislaid my notes on the figure in Griffith's Cuvier; that in Guérin I have never seen. My recollection is that the figure is on the same plate with that of *Callimorpha Lecontei* (pl. 32), and is the lower figure on the plate. I never had any doubt of its being the species afterward called *treatii* by Mr. Grote. Dr. Packard had evidently not seen this species when he hazarded the suggestion that this might be the same as Walker's *brevicornis*.

C. nigricans Reakirt.

1864—Reak., Proc. Ent. Soc., Phil., II., 371, *Crocota*.

Habitat—Philadelphia, Pa.

Unknown to me.

C. obscura Stretch.

1885—Stretch, Ent. Amer., I., 103, *Crocota*.

Habitat—N. H., Pa.

C. opella Grote.

1863—Grt., Proc. Ent. Soc., Phil., I., 345, *Crocota*.

1863—Grt., Proc. Ent. Soc., Phil., II., 30, pl. 2, f. 1.

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota*.

1877—Butl., Tr. Ent. Soc., Lond., 367, *Eubaphe*.

Habitat—Pa., N. Y., Can.

Butler says Walker included specimens of this species with his *rubicundaria*.

C. opelloides Graef.

1887—Graef, Ent., Amer., III., 42, *Crocota*.

Habitat—Texas.

C. ostenta Hy. Edwards.

1881—Edw., Papilio, I., 12, *Crocota*.

Habitat—Arizona.

C. quinaria Grote.

1863—Grt., Proc. Ent. Soc., Phil., II., 30, pl. 2, f. 2, ♀, *Crocota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 105, *Crocota*.

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota*.

choriona Reakirt.

1864—Reak., Proc. Ent. Soc., Phil., II., 371, *Crocota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 105, ? pr. syn.

1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. syn.

bimaculata Saunders.

1869—Saund., CAN. ENT., II., 51, *Arctia*.

1882—Grt., New List, pr. syn.

Habitat—Mass., Can., Pa., Colo. "8,000 ft."

C. rubicundaria Hübner.

1825—Hbn., Zutr., p. 28, 256, ff. 511, 512, *Crocota*.

1855—Walk., C. B. Mus. Lep. Het., II., 536, *Crocota*.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 541, *Crocota*.

1862—Morris, Synopsis, 256, *Crocota*.

1862—Clem., App. to Morris Syn., 307, = *Phrag. rubicosa*.

1866—H.-Schaeff, Corr. Blatt, XX., 118, ?, = *aurantiaca*.

1867—Grt., Proc. Ent. Soc., Phil., VI., 313, *Crocota*.

1868—Bethune, CAN. ENT., I., 18, *Crocota*.

1877—Butler, Tr. Ent. Soc., Lond., 367, *Eubaphe*.

Habitat—Can., Mass., N. Y., Ga., Ills.

According to Butler, the *rubicundaria* of Walker is not Hübner's species, but seems a mixture of at least three other species.

Genus EMYDIA Boisd.

1829—Boisd., Ind., Meth.

This genus I know only in the European species, and from descrip-

tions by European authors. In appearance it is *Lithosii*-form, with rather narrow primaries and broad secondaries; the vestiture is close, smooth; vein 5 of secondaries is said to be wanting; fore-tibia unarmed; the spurs of middle and hind tibia normal. I do not remember the venation of primaries, and made no note as to the origin of vein 10.

E. ampla Grote.

1878—Grt., CAN. ENT., X., 232, *Emydia*.

Habitat—Colorado.

Genus *UTETHEISA* Hübner.

1816—Hübner., Verzeichniss, 168.

A well marked genus containing very handsome and extremely variable species, since it has been determined that all our forms are but varieties of one species. The head is distinct, free, eyes rather large, not prominent, ocelli distinct. The palpi are slender, ascending, reaching the middle of front, the terminal joint rather long, closely scaled. Antennæ moderately long, slender, simple in the ♀, in the ♂ the joints marked with single lateral bristles. Legs closely scaled, quite considerably longer posteriorly, all the spurs complete and moderate in length. Body closely scaled. Primaries with vein 10 out of the subcostal, a short cross vein connecting it with the stalk bearing 7, 8 and 9, and thus forming an accessory cell; 6 is from the end of the sub-costal; 4 and 5 are close together out of the end of the median; 3 somewhat remote from 4, but much nearer than to 6. Secondaries with 3, 4 and 5 very close together from the end of the median; 6 and 7 together from the end of the sub-costal; 8 as usual about one-third from base out of the subcostal. Both *Crocota* and *Emydia* lack vein 5 of secondaries, which is a decided *Lithosiid* tendency; *Utetheisa* has 5 well marked, and has a distinct accessory cell, the relation to *Callimorpha* being obvious in the entire scheme of venation.

As the species are attractive as well as variable, the literature is voluminous, and yet I have given none of the "popular" or economic references.

N. bella Linne.

1758—Linn., Syst. Nat. Ed., X., 534, *Tinea*.

1767—Linn., Syst. Nat. Ed., XII., 885, *Tinea*.

- 1764—Linn., Mus. L. U., 399, *Tinea*.
 1770—Drury, Exot., I., 51, pl. XXIV., f. 3, *Tinea*.
 1775—Fabr., Syst. Ent., 585, *Bombyx*.
 1781—Fabr., Sp. Int., II., 203, *Bombyx*.
 1787—Fabr., Mant. Ins., II., 131, *Bombyx*.
 1791—Oliv., Encycl. Meth., V., 99, pl. 72, f. 10, *Bombyx*.
 1793—Fabr., Ent. Syst., III., p. 479, *Bombyx*.
 1793—Gmel., Ed. Linn. Syst. Nat., 2447, *Bombyx*.
 1816—Hübner, Verzeichniss, 168, *Utetheisa*.
 1837—Westwood, Ed. Drury, I., 46, *Deiopeia*.
 1841—Harris, Rept. Ins., Mass., *Deiopeia*.
 1841—Duncan, Nat. Libr., XXXII., 191, pl. 24, f. 1, *Deiopeia*.
 1855—Wlk., C. B. Mus. Lep. Het., III., 568, *Deiopeia*.
 1862—Morris, Synopsis, Supplt., 251, 313, *Deiopeia*.
 1862—Harris, Inj. Ins. Flint Ed., 342, pl. VI., f. 2, *Deiopeia*.
 1864—Pack., Proc. Ent. Soc., Phil., III., 105, *Utetheisa*.
 1865—Grt., Proc. Ent. Soc., Phil., V., 234, *Utetheisa*.
 1866—H. Schaeff, Corr. Blatt, XX., 119, *Callimorpha*.
 1869—Bethune, CAN. ENT., I., 18, *Utetheisa*.
 1873—Stretch*, Zyg. & Bomb., 56, 236, pl. 2, f. 15, *Utetheisa*.
 1875—Saund., CAN. ENT., VII., 85, f. 1, *Deiopeia*.
 1877—Butler, Trans. Ent. Soc., Lond., 361, *Deiopeia*.
 1879—Hulst., Bull. Bkln. Ent. Soc., I., 83, *Deiopeia*.
 1883—Edw.* Papilio, III., 128, *Utetheisa*.
 1886—Moeschl., Ent. Amer., II., 75, *Utetheisa*.
 1887—Gundlach, Cont. Ent. Cuba, 257, *Utetheisa*.
 var. hybrida Butler (between *bella* and *ornatrix*).
 1877—Butl., Trans. Ent. Soc., Lond., 361, *Deiopeia*.
 var. ornatrix Linn.
 1758—Linn., Syst. Nat. Ed., X., 511, *Noctua*.
 1767—Linn., Syst. Nat. Ed., XII., 839, *Noctua*.
 1764—Linn., Mus. L. U., 384, *Noctua*.
 1770—Drury, Exot., I., 51, pl. 24, f. 2, *Noctua*.
 1775—Fabr., Syst. Ent., 586, *Bombyx*.
 1779—Cram., Pap. Exot., II., 107, 108, pl. 161, ff. C, D, F, *Phalaena*.
 1781—Fabr., Sp. Ins., II., 203, *Bombyx*.
 1787—Fabr., Mant. Ins., II., 131, *Bombyx*.

- 1791—Oliv., Enc. Meth., V., 100, *Bombyx*.
 1793—Fabr., Ent. Syst., III., 1, 479, *Bombyx*.
 1816—Hbn., Verzeichniss, 168, *Utetheisa*.
 1820—Hbn., Samml. Ex. Schmett., II., pl. 394, *Utetheisa*.
 1837—Westw., Ed. Dru., I., 46, pl. 24, f. 2, *Deiopeia*.
 1855—Walker, C. B. Mus. Lep. Het., III., 567, *Deiopeia*.
 1856—Lucas in Sagra's Cuba, 301, *Deiopeia*.
 1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. var.
 1873—Stretch, Zyg. & Bomb., 58, pl. 2, f. 18, *Utetheisa*.
 1877—Butler, Trans. Ent. Soc., Lond., 361, *Deiopeia*.
 1886—Moeschl., Ent. Amer., II., 75, *Utetheisa*.
 var *intermedia* Butler (between *bella* and *speciosa*).
 1877—Butl., Tr. Ent. Soc., Lond., 361, *Deiopeia*.
 var *speciosa* Walk.
 1855—Wlk., C. B. Mus. Lep. Het., III., 568, *Deiopeia*.
 1862—Morris, Synopsis Suppl., 314, *Deiopeia*.
 1865—Grt., Proc. Ent. Soc., Phil., V., 234, pr. var.
 1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. var.
 1873—Stretch, Zyg. & Bomb., 57, pl. 2, f. 16, *Utetheisa*.
 1877—Butl., Tr. Ent. Soc., Lond., *Deiopeia*.
 1886—Moeschl., Ent. Amer., II., 75, *Utetheisa*.
 bella † Cram.
 1779—Cram., Pap. Ex., III., 20, pl. 109, ff. C and D, *Phalaena*.
 1886—Moeschl., Ent. Amer., II., 75, = *speciosa*.
 Habitat—Can. to D. C., Ga., west to Miss., Ia., Mo., for *bella*—
 varying to *ornatrix* in Tex., Mex., Fla., West Indies, where
 also *speciosa* occurs.
 Recorded food plants are *Crotalaria*, *Lupin*, *Prunus*, *Lepedeza*,
 Ulmus.

Few species have greater bibliography, and, as already hinted, it is far from complete.

Mr. Butler's paper in the Trans. Ent. Soc., London, for 1877, seems to have been lost sight of. Mr. Grote does not quote his varieties in his "New List," nor does Mr. Hy. Edwards, in his additions, Ento. Amer., March, 1888, refer to them.

(To be continued.)

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