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No. 12.

THE CLASSIFICATION OF THE BOMBYCIDÆ.

(Fourth and Last Paper.)

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

Sub-family *Attacinae*.

The subfulcate primaries ally this group to the *Platypteryginae*, and a certain vague resemblance to the *Geometridæ* may be found in the tendency which the upper surfaces of the wings show to display the same pattern on both wings. The ocelli are absent, the oral structure undeveloped, the hind wings are without frenulum. The species form mostly large cocoons, and the characteristics of the family are pronounced in this sub-family of silk-spinners. The male antennæ are feathered to the tips, each joint bearing a double pectination. The antennæ are comparatively short; in the female the pectinations are shorter. On the fore wings, vein 5 is much closer to 6, than to 4, arising from the upper corner of the cell. The caterpillars are thick and short rather than long, the segments tending to become centrally elevated, with prominent incisions. In the early stages they are bristled; in the later stages of *Platysamia* and *Saturnia*, for instance, characteristic colored warts appear. They are almost polyphagous. Long lists have been given by Mr. Beutenmuller, of the food plants of our common North American forms. Our beautiful *Actias luna* has an Asiatic ally in *A. selene*, and, I conclude, that the genus *Actias* in our fauna must be regarded as a relic of a former Arctic, circumpolar fauna, the more so as it is seen to be absent south of the equator in the New World. Leach's genus *Actias* is older than *Tropæa* of Hübner, which Dr. Packard used, hence I retain it in my Check Lists. We have in California, and again in Texas, species of the European genus *Saturnia*; I have elsewhere drawn attention to the fact that there exists a certain resemblance between the two faunæ, of which this is an instance.

Sub-family *Hemileucinae*.

Whereas the *Attacinae* spin thick cocoons above the surface, and have subfalcate primaries, in this group, so far as I have studied them, the fore wings are blunt or rounded, and the cocoon is made at the surface of the ground mixed with *debris*. The caterpillars in their last stage are bristled, and resemble those of *Platysamia* in their earlier stage. This group, represented by the typical genus *Hemileuca*, prepares us for the following *Ceratocampinae*, in the gradual modification of its characters. In its closely allied species and tendency to local modification it recalls such lower genera as *Clisiocampa*. Perhaps the genus *Quadrina* belongs here; of this I have had only a single specimen to examine. When both sexes are known and nearer comparisons are made it may be that we have to do with a distinct sub-family type. Mr. Smith, after seeing the type, referred it to the *Cossinae*. I do not believe this, or that we have to do with an internal feeder. Later, he appears to have reverted to my original idea that the genus was related to *Gloveria*, referred by Dr. Packard to the *Lachneinae*, perhaps from its resemblance to the European *Otus*. The eggs of *Hemileuca* are laid like those of the *Lachneinae*, in ring-form, and the abdomen is likewise tufted at the extremity.

Sub-family *Ceratocampinae*.

In this group, defined by Harris, a cocoon is rarely made and the transformation is subterranean. The female antennæ are sub-simple or simple, and the male antennæ are not pectinate at the tip. The abdomen is longer, the squamation smoother, and, while the main Attacid characters are still retained, there is an evident departure in a fresh direction. The ocellate marks on the secondaries are here and there apparent, but the ornamentation has become simpler, and the lowest form, *Dryocampa rubicunda*, has a resemblance in all stages to the ensuing *Lachneinae*. The caterpillars are often bizarre in appearance from the spines and horns with which they are ornamented, especially in the genus *Citheronia*, where they probably serve as a defence by frightening their different enemies. There seem to be two groups of larval types, the extremes of which are displayed by *Eacles* and *Citheronia*; the larvæ of the *Eacles* type, approaching the preceding Attacid type, those of the *Citheronia* type approaching gradually the *Lachneinae*. The distribution of this sub-

family is somewhat limited. It appears to be American, and to be confined to the plains east of the rocky backbone of the continent from north to south. In our fauna it seems to be a southern element. Hübner calls this group *Communiiformes*. Perhaps he intended thereby to indicate a return to the more usual moth form, the fore wings tending to become narrower, the secondaries subordinating, the abdomen lengthening. I have in my "Hawk Moths" alluded to the probability that the Hawk Moths may be a further offshoot from the Lepidopterous stem in a parallel direction with the *Ceratocampinæ*.

Sub-family *Lachneinæ*.

In this group there is a return to the normal moth form with a tendency to the lengthening of the abdomen noticeable in the caterpillars. This lengthening of the abdomen and a certain weakness in structure dependent upon this lengthening, seems to be indicative of lower rank in insects generally and in the several suborders. The moths of the *Lachneinæ* resemble preceding groups in the absence of ocelli and frenulum. The hind wings are subordinate to the primaries, the colors mostly of shades of brown and gray, with oblique transverse bands, more or less broken. The palpi are more prominent than in the preceding groups, the tongue remaining weak. The ornamentation of the long-bodied caterpillars consists of tufts of hair. Our North American fauna is poor in species. We have two genera derived from a former circumpolar fauna, also found in Europe, *Clisiocampa* and *Gastropacha*. We have, then, two genera which seem to me of South American extraction, *Tolype* and *Artace*. The species of *Clisiocampa* are very closely allied. They offer ground for the correctness of the view which I have expressed that in North America, species tend to vary, to throw off local, perhaps, what Walsh called phytophagic varieties or species. The wide extent of country, with its differing climate and flora, inhabited by *Clisiocampa*, has led to the throwing off of specifically appearing forms, which may have hardened in most cases into true species, separable in nearly all stages by external characters. An instance is offered also by *Datana*, which I regard as an offshoot from *Phalera*; while there are only two species of *Phalera*, there seem many closely allied species of *Datana*. The eggs are laid in a ring-form on twigs, and the caterpillars of *Clisiocampa* are well-known as enemies by the orchardist.

Sub-family *Cossinae*.

The larva and moth are long-bodied, and this group is characterized by the former being internal feeders. They are brown and livid in color and coleopterous-looking, as are internal feeders generally, belonging to whatever order of insects. They have this habit in common with *Castnia*, and *Sesia*, but this has probably survived, while the other characters have differentiated so that we cannot consider the habit as uniting them in a modern family. The female *Cossus* has an external ovipositor, which is an index for the habit of the caterpillar. The ocelli are wanting and the tongue is quite rudimentary. The male antennæ are pectinate, the wings are somewhat narrow and the habitus is sphingi-form. I have watched the exclusion of *Cossus* from the cocoon, the very active and moveable chrysalis being forced out into the air before the shell is broken. Dr. Bailey gives a good account of the transformations of Bailey's Goat Moth, *Cossus centerensis* of Lintner. We have representatives of the European genera *Cossus* and *Hypopta*, while *Prionoxystus robinia*, the Locust Goat Moth, seems to me decidedly a distinct form of North American origin.

Sub-family *Hepialinae*.

In this group we have, without a doubt, the lowest Spinners. The long thorax, with its subequal metathorax, draws the insertion of primary and secondary wings apart. The subequal wings with pointed tips and the 12-veined secondaries, the short antennæ, spurless tibiæ are suggestive of the Neuroptera. The distribution of the group is very general throughout the world; and this fact, together with the striking structural resemblance of its members, leads us to believe we have to do with an old and long preserved type of moth. The caterpillars are root feeders, like those of the *Cossinae*, sixteen footed, naked, yellowish. The eggs are remarkable for their fineness, looking like gunpowder. The cocoon is subterranean, a cell lined with silk. We have very fine species in North America, referred by Dr. Packard to *Sthenopsis*, but which, notwithstanding their size, seem to me congeneric with the European *Hepialus humuli*. The limits of the genus may be reached with the beautiful *H. auratus*, which has a structural ally figured by Herrich-Schæffer from Brazil. The species are generally rare; the moths fly in the dusk of evening and are an object of interest, with most collectors.

So far we have gone over the principal features of the *Bombycidae*, more in explanation of the sequence adopted by me in the Check Lists, and which is that of Dr. Packard's Synopsis of 1864, than in any attempt to re-classify the family. But Dr. Packard gives no definitions of the higher groups, and the diagnoses of the new genera do not include certain structural characters, as, for instance, the neuriation. I cannot here attempt to limit the genera, and I only give the characters which render the higher groups more or less recognizable. The neuriation must be comparatively studied. As a whole it seems to me to show characters of simplicity. The cells are generally open; there is an absence of accessory cells and crowding of veins, such as we see in some other families of moths. We can believe that the *Sphingidae* may have been thrown off from the same stem when we compare the neuriation. Other characters, such as the absence of ocelli, may be additional indices. In the *Noctuidae* the ocelli are quite rarely absent, in the *Geometridae* quite rarely present. But they appear in some sub-families of *Bombycidae*, though not in the lower ones and in the more typical Spinners, such as, I think, stand nearer to the Hawk Moths. The *Bombycidae* are, as we find them now, detached groups with very diverse resemblances to other now distinct families of Moths. In this diverse resemblance lies the proof of the synthesis which the Spinner Moths present. To detach the different sub-families which we have here discussed is to lose sight of some of those finer questions of relationship which a close study of these insects calls up. No family of Moths is more interesting to the student on this account than the *Bombycidae*, with its great diversity of structure, appearance and habit. To the collector the beauty of the moths, their bright colors, the soft shading, the size of most of the species is equally tempting, while to the practical mind, the fact that the silk-worm, *Bombyx mori*, and other silk-producers, belong to the *Bombycidae*, must render the pursuit of these insects sufficiently attractive. They live short lives, the incomplete mouth parts render food-taking to many kinds an impossibility; they live so long as caterpillars or chrysalids, and lay their eggs and die. But the human mind seizes upon the many considerations, which it has evolved from a study of the facts presented by these creatures, and turns them to its profit or its pleasure.

NOTES ON *DANAIS ARCHIPPUS*, FABR.

BY MISS EMILY M. MORTON, NEW WINDSOR, N. Y.

Having been requested by my friend, Mr. Wm. H. Edwards, to make observations on *Danais Archippus* during the seasons of 1887 and 1888, and subsequently having written to him the result of such observations, he requested me to publish in the CANADIAN ENTOMOLOGIST the substance of what I had already written him in my letter. I wrote out a paper about July 5th, which, however, was lost in the mails, and the paper now sent is a partial copy of the original, though somewhat altered, as the first was over four months old.

All my observations were made in New Windsor, N. Y., which town is situated on the banks of the Hudson, directly opposite the hills which bound the northwestern borders of Connecticut.

Archippus is not more rare with us than many of our hibernating butterflies, and seems to me in no way abnormal.

It has always appeared when a certain Persian-lilac bush blooms, flying over and alighting on the blossoms.

Last summer (1887), the first hibernators came, as has already been stated by Mr. Edwards, May 3rd and 4th; this season everything being later with cold rains and high winds, the lilacs did not blossom out until May 10th, when *Danais Archippus*, (how I love the dear old familiar names!) allured by the first warm sunny day, and the perfume of the opening blossoms came forth to drink of the nectar, and having refreshed herself, hastened away to deposit her eggs before her few remaining days are gone, and she is gathered to her forefathers. This butterfly could not have been a "colonist," for nothing so frail could have flown any distance in the high wind and beating rain of the preceding day, and it was not later than 9.30 a. m., the flowers and leaves still heavy with rain, so she must have come from a very short distance—possibly from the ruins of an old shed a hundred yards or so from the bush.

Has any one ever found a hibernating Archippus? Yet, we all know they do hibernate.

In the earlier days of my collecting, many and many a stump has been peeled of its bark, and even split to satisfy the craving for something new, yet never an Archippus has rewarded the most untiring search in that direction, though once, and in early May too, a *Vanessa Antiopa*, torpid,

though still alive, was revealed in the very centre of a stump cosily mixed up with the damp saw-dust left by the ants and other borers.

An egg of *Archippus* is a very tiny thing, and not easily found, even when sought for, and as Mr. Edwards says, "there are thousands of *Asclepias* plants to one *Archippus* butterfly," especially a successfully hibernated butterfly, as probably not one in ten of the hosts of September and October flies live to leave their hybernacula in the spring.

How many people have found eggs of *Hemaris Thysbe*? Yet in most places *Thysbe* is as common as blackberries, and the larvæ are often to be found on the snow-ball bushes, though not one in a dozen ever reaches maturity. Once I spent an hour looking for the egg which I saw *Thysbe* deposit on a tiny bush which might have been covered by a three quart pail, yet had to depart without it in the end.

Mr. Marsh, though an unusually intelligent and original observer, only succeeded in finding one egg, which goes to prove that *Archippus* eggs are harder to find than the larvæ or butterflies.

Mr. Fritz Senff, another very intelligent and accurate observer, though a recent acquisition to our small band of students and collectors, tells me he saw two perfectly fresh examples of *Archippus*, July 3rd and 6th, one flying in the veranda of his home in New Windsor, the other, which he caught, in a field not far distant; these were, doubtless, the first brood from the eggs of the hibernators; besides these, we saw while driving June 19th, 1888, five or six examples, none of which were broken or faded, though we were not near enough—that is, we had none in our hands, so as to be able to distinguish that rich plum-like bloom so dear to the collector of cabinet specimens, but which no butterfly ever carries having once flown even "for a few short hours."

Every collector or exchanger well knows how perishable is that same bloom, and how utterly different is any hand-raised specimen, from a poor wind-blown, grass-scratched passé imago, or even one who has dragged its undeveloped wing through the sharp blades of grass to find a resting place whereon to expand them.

Surely *Archippus* is one of the most perishable species, for the "bloom" is as ephemeral as the dew of a summer morning, or the purple down of all the *Hemaris* tribe; one slight breath and it is gone forever!

As to any species laying "for a month or so," what collector or breeder

of any lepidopterous insect has ever known any species to live and deposit eggs for two weeks—to say nothing of “a month or so?”

In most of the Heterocera five days is the usual period of life after the ♀ has paired. Every collector of course knows that most species will live longer if kept from their mates, which is a provision of nature to prevent the extermination of species. A *Phobetron pithecium* accidentally kept from her mate lived eight days, mating the fifth; another mating the first day from pupa deposits her eggs and dies the fourth day.

I am no friend to the theory of colonization, though of course, I know eggs and pupa are often brought to and from distant countries in the commerce of nations; but that anything so fragile as a butterfly or moth should fly hundreds of miles, and not only that, but entirely change its habits on its arrival, even though that country should be nearly identical with its own in climatic properties, becoming from a double or three brooded species a single one, seems out of all reason.

That a hibernating Archippus should be more or less shabby, according to its hybernacula, is of course, highly probable; and, I agree with Mr. Edwards, in judging that a freshly hatched butterfly, finding a cold dry place wherein to hibernate, should appear in the late spring, less faded and unstained than another in a wet and exposed situation; but that any should appear after the wear and tear of a northern winter, or a flight of an hundred miles with the glorious hues of an imago fresh from chrysalis, is utterly beyond belief.

This season, after an unparalleled winter, the first “western blizzard” ever experienced in the State of New York, we have had swarms of hibernated *P. Atalanta*; one would not suppose there were enough nettles in the whole of New Windsor to afford nourishment to the hundreds which have appeared during the month of May. Did they fly from the Gulf of Mexico? *Quien sabe?*

A curious variety of *Papilio turnus* was found here in New Windsor, closely resembling fig. 3 in plate 5 of Mr. Edwards's Butterflies of North America. She was taken in the grass July 8th, but could not fly as her wings were crippled on one side. She is darker than Mr. Edwards's specimen, looking like a *Glaucus*, but with a powdering of yellow scales covering the inner surface of all the wings. Could the blizzard of the 12th of March have produced this variety?

October 29th, 1888.

THE CHALCID GENUS RILEYA.

BY WM. H. ASHMEAD, PHILADELPHIA.

My good friend Mr. Howard, in his article entitled "The Chalcid Genus Riley," published in the October CAN. ENT., p. 191, makes several inaccurate statements; and, in the lines "An interesting interference in the adoption of the generic name Riley has recently taken place between Mr. Ashmead and myself," implies that I knowingly appropriated this name for a genus in the *Eurytominae*, after he had decided to use it for one in the *Encyrtinae*, when I had no such knowledge, thereby placing me in an unenviable position before my colleagues.

For the guidance of those who will have to settle this question, I must state that my description of the *Eurytomid* genus Riley was drawn up and forwarded to Prof. E. A. Popenoe for publication about the last of November, 1887, and a synoptic characterization of the genus appeared in the *Entomologica Americana* for June 1888, although the full description of the genus was not published, as stated by Mr. Howard, until afterwards—about July 5th, one month later; still, both of these descriptions were published three or four months ahead of Mr. Howard's.

The opinion, expressed by Mr. Howard, that because the name Riley is given in my synopsis of the *Eurytominae*, "not as a new genus, but as one already described, and the few words given to it in the table fail to sufficiently characterize it," is a matter of surprise to me, for the characters given definitely separate it from all other *Eurytomids*, the characters are too unique among the *Eurytominae* to be mistaken, and as to whether it was indicated as a new genus "has nothing to do with the case." I might have indicated the genus without my name, or in the usual way—nov. gen., mihi., *et cetera*, yet the genus would hold.

As I have before stated, I had no knowledge of Mr. Howard's intention to dedicate a genus to Dr. Riley, and I regret that such knowledge was withheld from me, so that a controversy of this kind could have been avoided. The first intimation that I had of his intention to do so was on receipt of my July number of the *Entomologica Americana*, received, I think, about July 12th, and several months after my description of the genus had been forwarded to Prof. Popenoe; and just one month after the publication of my "Revised Generic Synopsis of the *Eurytominae*."

Mr. Howard's paper on *Rileyia* n. g. was not read before the Entomological Society of Washington until June 7th, 1888, and not 1887, as stated in the CANADIAN ENTOMOLOGIST; while my synopsis was at that time already published. If there is any "interference" in the adoption of the generic name *Rileyia*, it is on the part of Mr. Howard.

Besides the above "facts," I would state that the types of my genus *Rileyia* were shown to both Dr. C. V. Riley and Mr. H. G. Hubbard, at my home in Jacksonville last winter, and at that time Dr. Riley made no mention of Mr. Howard's genus *Rileyia*, although he did desire, for reasons of his own, that if it were possible, the name of the genus should be changed.

It is unfortunate that Mr. Howard, in describing his new genus *Rileyia*, failed to go over the European literature on the subject, for, both from his figure and description, it seems to be identical with Dahlbom's genus *Lonchocerus*, described in 1857, *Ofversigt af Kongl. Vetenskaps-Akademiens Förhandlingar*, vol. xiv., p. 293. Mr. C. G. Thomson, *Hymenoptera Scandinaviæ*, Tom. iv., Fasc. I., p. 116, in speaking of this genus, says:—"Abdomen globosum. Pronotum magnum. *Antennæ scapo et flagellum valde compressis*;" and on p. 130, in speaking of the scutellum:—"Scutellum *dense holocericeo-pubescentis*." These characters seem to be the essential characters of Mr. Howard's genus *Rileyia*, the only real difference being in the shape of the head; but whether or not Mr. Howard's genus is identical is immaterial, my Eurytomid genus of the same name having the priority.

In seeking to suppress the genus Mr. Howard has violated all the well established rules of zoological nomenclature.

JOHN ABBOT, THE AURELIAN.

BY W. F. KIRBY, BRITISH MUSEUM, LONDON, ENGLAND.

In the August part of the CANADIAN ENTOMOLOGIST, pp. 149-154, I notice an article on this subject by my friend, Mr. Scudder, and I may, perhaps, be able to add some additional remarks.

The volume on Exotic Moths, published by Duncan in Jardine's "Naturalist's Library," contains (pp. 69-71) a short account of Abbot's life and works, and incorporates the notice by Swainson, to which Mr. Scudder refers. Swainson remarks, respecting the plates, "M. Francillon possessed many hundreds, but we know not into whose hands they have

as every volume bears the book-plate of "John Francillon." There are passed." I may say that this is evidently the set in the British Museum, 17 volumes (not 16); the first 15 bear the date 1792 on the printed title pages, and the two last volumes 1804 (not 1809). The contents are as follows:—

- Vols. 1-4. Coleoptera.
 " 5. Orthoptera, Hemiptera, Homoptera and Heteroptera.
 " 6. Lepidoptera Rhopalocera.
 " 7-11. Lepidoptera Heterocera.
 " 12. Neuroptera, Hymenoptera.
 " 13. Diptera.
 " 14. Arachnida.
 " 15. Myriopoda, Mallophaga, Acarina, Crustacea, Lepidoptera (transformations), &c.
 " 16. Portrait, Orthoptera, Coleoptera (transformations), Lepidoptera (transformations).
 " 17. Lepidoptera (transformations).

The drawings of transformations of *Lepidoptera* are rarely, if ever, duplicates of those published by Smith, sometimes representing a different variety of the larva of the same species; and they are nearly three times as numerous. There are only about a dozen drawings of transformations of *Coleoptera*. Among the lesser-known orders, there is little doubt that many species figured are still undescribed.

I fully expect that some of Abbot's correspondence will be discovered (of course, including his autograph), perhaps at the Antipodes, for Swainson left England towards the close of his life, and died, according to Hagen, in New Zealand, in 1856.

I am surprised that Mr. Scudder has not mentioned the volume of Abbot's Drawings presented by Edward Doubleday to Dr. T. W. Harris (Harris, Entomological Correspondence, p. 123). If this volume is the same as that said by Mr. Scudder to have been presented by Dr. J. E. Gray to Dr. Asa Gray, some error must have arisen. Possibly it came into Dr. Asa Gray's hands directly, or indirectly, from Dr. Harris, with an erroneous impression respecting the original English donor.

There are a number of specimens originally collected by Abbot in the British Museum, and probably in other collections. The Museum of the Royal Dublin Society (now known as the Dublin Museum of Science and

Art) contains a large series of bleached specimens of insects of various orders (*Lepidoptera*, *Neuroptera*, &c.) which were not improbably collected by Abbot (Cf. some notes by Mr. McLachlan, Ent. M. Mag. x., pp. 227, 228).

NOTE BY MR. SCUDDER.—The small volume of paintings referred to by Mr. Kirby is in the library of the Boston Society of Natural History, and was not mentioned by me because the less said about it the better. It was picked up at a book shop, bears the date 1830, and though Doubleday paid seven guineas for it, it is certainly not the work of Abbot, but of a very inferior copyist—some of the paintings being the merest daubs. It has scarcely the least value. The notice by Duncan I had not seen, but I find that it adds nothing to the facts of Abbot's life. Either I have never seen the seventeenth volume of Abbot's drawings at the British Museum referred to by Mr. Kirby, or, if it concerns the moths only, may for that reason have taken no note of it. My memorandum of the dates must have been incorrectly copied.

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB
OF THE AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE.

(Continued from page 198.)

Thursday, Aug. 16th.—The Club reassembled at 3.30 p. m. Papers by Mr. Clarence M. Weed on "The Parasites of the honey-suckle Sphinx, *Hemaris diffinis*, Boisd.," and on "The Hymenopterous Parasites of the Strawberry Leaf-roller, *Phoxopterus comptana*, Fröl.," were read by the Secretary in his absence. Mr. H. Osborn read an interesting paper on "The Food-habits of the Thripidæ." Mr. Smith gave an account of the collection of Mr. D. Bruce, of Rockport, N. Y., which was chiefly made in Colorado; it is especially remarkable for the long series of specimens of many species of Lepidoptera. Among others he has *Chionobas bore* in great numbers from the Rocky Mountains, proving it to be distinct from *C. Semidea* of the White Mountains; also an immense series of *Colias eurytheme* in all its varieties, and numbers also of many species of Noctuidæ.

Friday, Aug. 17th.—The Club met at 9 o'clock a. m. A paper was read by Dr. D. S. Kellicott, on *Hepialus argenteo maculatus*, which he

succeeded in raising from larvæ obtained in Oswego County, N. Y.; it bred in the roots and stems of *Alnus incana*. Mr. Schwarz stated that he had taken the moth, near Marquette, Lake Superior, on July 29th, this year. Mr. Smith considered it to be quite generally distributed, breeding in oak, willow and poplar. Mr. H. Osborn read a note on the occurrence of *Cicada rimosa* Say., in Iowa.

Prof. O. S. Westcott, related the occurrence of a large gathering of butterflies about the carcass of a dead dog at Port Arthur, in June last; one hundred and ten specimens were counted, chiefly consisting of *D. archippus* and some *L. arthemis*, *Colias* and *Melitæa*. In the same locality he captured, July 20 to 23, nineteen examples of *Melitæa*; of these one was *Nycteis*, and seventeen *Tharos*—eight of the form *Marcia*, and nine *Morpheus*. He next gave an interesting account of the numbers of *Lachnosterna fusca* and *gibbosa* taken at Maywood, Ill., by means of a trap attached to a street-lamp, during the months of May and June, 1887 and 1888. He also gave a list of 1192 specimens belonging to 65 species captured in his trap on the night of June 13th, 1888; of these 730 were *Agonoderus comma* and 204 *Lachnosterna gibbosa*.

Mr. Howard gave an account of some recent experiments made under Dr. Riley's direction at Washington, with kerosene emulsion as a remedy for white grubs, the larvæ of *Allorhina nitida*. He stated that the grass had died over large areas of the affected lawn, and the soil was full of the grubs. The affected portion was treated with kerosene emulsion diluted fifteen times with water and applied with an ordinary watering-pot; the ground was then kept saturated for some days with ordinary water from a hose. A month afterwards, on digging into the part treated, the grubs were found to have descended sixteen inches into the soil, and all had died. In the untreated parts the larvæ were all alive and only two or three inches below the surface. There was no injurious effect upon the grass, even when the emulsion was only diluted half as much. He considered that the experiment was entirely successful. In the discussion that followed, it was evident that this remedy is much too expensive for adoption on a large scale, and could only be of practical use on a lawn or plot of land of special value. Dr. Peabody stated that Prof. Forbes had found the kerosene emulsion entirely successful against the common white-grub (*Lachnosterna*); but as its application cost at the rate of about \$100 per acre, it was far too expensive for ordinary purposes.

The Club met again at 3 p. m. Mr. Fletcher gave an account of his expeditions to Nepigon, Lake Superior, in search of the eggs of butterflies. Very little is known, he stated, regarding the early stages of many of our diurnals; of even so common a species as *Pamphila cernes* they were unknown. In 1885, Prof. Macoun, of the Geological Survey of Canada, collected specimens at Nepigon of a new butterfly, which was named after him by Mr. W. H. Edwards as *Chionobas Macounii*. In 1886 and 1887, Mr. Fletcher went to Nepigon in search of this insect, travelling about 1,500 miles on each occasion, but without success. This year he went again, early in July, accompanied by Mr. S. H. Scudder, of Cambridge, Mass.; on the first day after their arrival they caught five males; the next day nine females were caught and caged; from these they obtained about 250 eggs. The egg is larger than and quite different from that of *C. Jutta*, which has been found near Quebec, and bred by Mr. Fyles. Mr. Fletcher also obtained eggs of *Jutta* at Ottawa, and reared the larvæ from them; the eggs were laid on July 1st, and hatched on the 16th; those of *Macounii* were laid on the 12th and hatched on the 27th. At Nepigon, he and Mr. Scudder obtained the eggs of 14 species out of 16 that they caged. He then gave a full and most interesting account of the methods of capturing, caging and treating butterflies in order to obtain their eggs, and mentioned that he had received very valuable information and aid from Mr. Scudder in the matter. The simplicity of the apparatus employed deserves mention: "Cages for all small species can be made in a few minutes by cutting off the top and bottom of a tomato can, and then fastening a piece of netting over one end, either by slipping an elastic band over it, or tying it with a piece of string. The female is then placed in this over a growing plant of the species that the larvæ are known to feed upon. These cages had answered well for all the skippers which feed on grass, and the small Argynnidæ. For such species as lay their eggs on the foliage of shrubs or trees bags had to be tied over living branches, care being taken that the leaves were not crowded up, but that they should stand out freely, so that the female could lay, if such were her habit, upon either the upper or lower side, or on the edge of the leaves. In this way eggs were obtained of *Nisoniades icelus* and *Papilio turnus*. Another cage for insects which lay upon low plants, and which is easily constructed, is made by cutting two flexible twigs and bending them into the shape of two arches which are put one over the other at right angles with the ends pushed into the ground; over the pent-house thus formed a piece of gauze is placed, and

the edges are kept down either with pegs or earth laid upon them. This kind was useful for larger insects than could be placed in the tomato cans. In these eggs of *C. Macounii*, *Colias eurytheme*, etc., had been secured." (*Entom: Americana* iv., 159). Mr. Fletcher then described the habits of a number of the species collected, referring especially to those already mentioned, and to *Pyrameis huntera*, *Pamphila hobomok*, *Mystic*, and *Cernes*, *Carterocephalus mandan*, *Colias interior*, *Argynnis Vialis*, *Myrina* and *Bellona*, *Nisoniades Persius*, *Fenesica Tarquinins*, etc. He also exhibited living larvæ of *C. Mandan*, *P. hobomok* and *Mystic*, and living imagines of *C. eurytheme*, which had emerged since his arrival in Cleveland. At the close of his address, Mr. Smith expressed the gratification all present felt in listening to so lucid and interesting an account from which everyone would carry away many practical and valuable hints.

The next paper was read by Mr. E. A. Schwarz, of Washington, on "The Geographical Distribution of the Semi-tropical Floridian Coleopterous Fauna." It was followed by a discussion, in which nearly all present took part, as to what should be considered the limits of the North American Fauna, and what species should be included in the fauna of a particular region, reference being especially made to semi-tropical species that are from time to time found in the north.

The Club next proceeded to the election of officers for the ensuing year, and unanimously selected the following: President, James Fletcher, Ottawa, Ont.; Vice-President, L. O. Howard, Washington, D. C.; Secretary-Treasurer, Dr. D. S. Kellicott, Buffalo, N. Y.

Saturday, Aug. 18th.—A most enjoyable excursion was made to Put-in-Bay by steamer on Lake Erie. There was a very large attendance of the members of the Association, including the Entomologists. This pleasant feature of the proceedings gave the members a much better opportunity of becoming acquainted with each other than would otherwise have been the case. Arrangements were made for the excursionists to stay on shore for about an hour, and this time was made good use of by the members of the Club. The insect of most interest was secured by Mr. Westcott, who collected in large numbers by beating a small spruce-tree, a remarkable Hemipteron, identified by Prof. Osborn as *Emisa longipes*. Many galls and parasitic fungi were also collected. Among the butterflies noted were *Colias philodice*, *Pieris rapæ*, and what appeared strange to Canadian eyes at this time of the year, *Papilio turnus*; *P. asterias* and

Pyrameis cardui were also observed, and a few specimens of *Utetheisa bella* were captured. The party returned to Cleveland much delighted with their day's outing, and separated to meet next year in Toronto.

ARCTIIDÆ vs. NOCTUIDÆ.

BY JOHN B. SMITH, WASHINGTON, D. C.

Mr. Grote takes occasion in CAN. ENT. vol. xx., p. 168, to criticise my reference of *Cerathosia* to the *Arctiidæ*, contending that it is a *Noctuid*. He complains that I do not give "the reason *why* it belongs to the family." This I hasten to supply, and must beg Mr. Grote's pardon for having presumed him conversant with the characters separating the two families. All authorities give for the *Noctuidæ* a furcate dorsal or internal vein of primaries, while the costal vein of secondaries is from the root; sometimes united with the sub-costal a short distance from base.

In the *Arctiidæ* on the contrary, the dorsal vein of the primaries is simple, while the costal of secondaries is not free, but springs from the sub-costal, a variable distance from base.

In these essential characters, used in all systematic works, my genus is *Arctiid* and *Lithosiid*. The only difference between the *Arctiidæ* and *Lithosiidæ* is in the absence of ocelli in the latter family. Mr. Grote seems never to have seen an unspread specimen of *Cerathosia*, else the striking habitual resemblance to *Lithosia* could not not have escaped him.

Mr. Grote has sent to Entom. Amer. a criticism of my genus in a different form, which I have answered more at length.

Some months since, I sent a paper on *Cydosia* and *Cerathosia*, which have considerable resemblance in clypeal structure, to the Proceedings U. S. Natl. Museum, and this when printed will show that my genus is not at all abnormal where I have placed it.

As I can hardly expect to convince Mr. Grote if the specimen itself failed, I have sent an example to Mr. H. B. Moeschler, of Germany, and requested his determination of family, for publication.

It is scarcely worth while to deal with Mr. Grote's objections in detail: Not one or all of them, even were they *all* true, would militate against the *Arctiid* character of *Cerathosia*. I must confess that I consider the

venation and habitus *Lithosiid* rather than *Arctiid*, and would prefer so to place it, even despite the presence of ocelli.

Lest Mr. Grote consider me ignorant, I will say here that I am aware that there are some Noctuids which have the dorsal vein of primaries not distinctly furcaté, and some where the costal of secondaries is united with the sub-costal a short distance from base, and thus appears to spring from it.

With this I leave *Cerathosia* to its fate. In my papers I have given *all* the characters, family and otherwise, and shall let each form his own judgment. It needs no more defence from me. In fact, I feel as though I owed an apology for answering objections, not a single one of which is vital.

Mr. Grote's characterizations in his series of papers on the *Bombycidae* are thoroughly superficial, none of the essential characters being emphasized, while some of them are absolutely incorrect—his definition of the *Lithosiinae* furnishes an example. He says unqualifiedly, "No accessory cell on primaries." Now, Von Heineman shows that in some genera it is present, while as a matter of fact some species of *Lithosia* have the cell (*cephalica*), while others have not. It is therefore not even a generic character in this group. To point out all the misleading and inaccurate statements, would necessitate criticising almost every paragraph of Mr. Grote's paper—a task I have neither time nor inclination for. In future I shall not reply to any criticisms Mr. Grote may make, save to admit their correctness where they are well founded.

POSTSCRIPT.—Since sending in the above, I have heard from Mr. Moeschler in regard to the specimens sent him. He writes me under date, Sept. 28th. :—"To-day I received the parcel containing the two moths. I have examined them, and there is no doubt you are right. This species belongs to the *Arctiidae*, as the costal nervule is not derived from the base of the hind wings, but from the discoidal cell; this characteristic separating the *Arctiidae* and *Lithosiidae* from the *Noctuidae*, which have this nervule derived from the base of the wing, only a little connected with the fore edge of the cell. I do not doubt this species is an *Arctiid*, near allied to *Deiopeia* and *Emydia*."

Under date Sept. 30th, Mr. Moeschler again wrote me :—"I received *Entomologica Americana* No. 6 to-day, and it was of great interest to me

to read yours and Mr. Grote's paper on *Cerathosia tricolor* Sm. If Mr. Grote had looked into Lederer's *Noctuiden Europa's* he could read, p. 2, 'sie (die *Noctuiden*) unterscheiden sich von den *Lithosiiden* (inclusive *Nola*, *Sarrothripa* u. *Nycteola*,) und *Arctiiden* durch die bei diesen aus der mitte oder zwei-drittel des vorderrandes der Mittelzelle entspringenden Rippe 8 der Hinterflügel.'

"Mr. Grote would have spared much pain to prove something not existing, by reasons which are not of any value, if he had remembered the only important characteristic separating the *Lithosiidæ* and *Arctiidæ* from the *Noctuidæ*. I am much surprised that so distinguished a writer as Mr. Grote can omit so important a characteristic; but the systematic position of the genera of the so-called *Zygænidæ*, in his New Check List, is sufficient to prove that Mr. Grote's systematic views are sometimes more than singular.

"Seeing the specimens of *C. tricolor*, my first thought must be: that is a Genus very allied to *Deiopsia* (*Utetheisa*) and *Emydia*, and I should have been much surprised if an exact examination had given another result."

CORRESPONDENCE.

Dear Sir: In reference to my note on the use of Creolin, I found subsequently discolorations on the leaves which did not appear to be either rust or mildew, but possibly were the result of the Creolin mixture. It is, however, probable that in this disinfectant we have a useful aid against insects as it seems to be avoided by cockroaches and ants, and probably woodwork might be preserved by it in greenhouses. I wished merely to draw attention to Creolin, so that those interested might try it; my own opportunities for doing so being very limited. The rose-bushes, of which I am very fond, seem on the whole no freer from insects in Europe than in America.

A. R. GROTE.

ARZAMA OBLIQUATA.

Dear Sir: In regard to Mr. Brehme's query, I may mention that all the *Arzama* larvæ and chrysalids taken here have been found in similar situations, but in no instance has there been the slightest indication that they fed there. The impression made by my observations is:—That the

caterpillars seek out their hibernacula in the fall, remain in that state during winter, and change to chrysalids with the first warm weather in spring. Caterpillars have been found yet imbedded in the winter's frost. In one instance I found one, in early spring, travelling about as if looking for a place to transform ; it produced a *Diffusa*. They have never been looked for here in the reeds ; as they grow almost entirely in the water, one would require the aid of a boat to make the investigation. When surveying the situation where I have found the Arzamas, I have often wondered how the caterpillars got from the reeds to the land. The shallow part of our marsh where they might easily get ashore is invariably burned over in early spring by pike shooters for their own convenience.

J. ALSTON MOFFAT, Hamilton.

BOOK NOTICES.

AN INTRODUCTION TO ENTOMOLOGY, by PROFESSOR J. H. COMSTOCK, Cornell University, Ithaca, N.Y. Published by the Author. Part I —pp. 234, 8 vo. (Price \$2.00).

The autumn of 1888 is certainly a notable one in the annals of North American Entomology, owing to the publication of so many important works. Last month we drew attention to Dr. Packard's excellent "Entomology for Beginners," and the issue of the first part of Mr. Scudder's grand work on the Butterflies of the Eastern States and Canada. We have now before us the first portion of another admirable work, which is intended to serve as a text-book for students, and to enable them "to acquire a thorough knowledge of the elementary principles of Entomology, and to classify insects by means of analytical keys similar to those used in Botany." The first two chapters of the book treat of the characters and metamorphoses, and the anatomy of insects ; the next discusses the Orders of the Hexapoda, to which the author very properly limits insects. In this chapter he gives his reasons for [adopting *ten* orders, the number being made up of the seven generally accepted orders and the Thysanura, Pseudoneuroptera and Physopoda ; in adhering so closely to the old classification, he states that he has been greatly influenced by a desire to make his book as simple as possible, and "by the belief that an elementary text-book should follow rather than lead in matters of this kind," in which opinion we thoroughly concur. The remainder of

this part of the work treats of the Orders Thysanura, Pseudoneuroptera, Orthoptera, Physopoda, Hemiptera and Neuroptera. In each chapter is given a general account of the Order treated of, an analytical table of the Families, a descriptive account of each family with, in many cases, tabular keys of the genera, and illustrations of the commoner species. Future parts will complete the discussion of the Orders, and furnish chapters on the remedies for noxious insects, directions for collecting and preserving specimens, etc. Judging from the portion before us, we have no hesitation in saying that the complete work will be a most valuable and admirable manual of Entomology; in clearness and simplicity of style, in excellence of illustration and in arrangement of matter, it leaves nothing to be desired. We must not omit to mention that the two hundred wood cuts are for the most part drawn and engraved by the author's wife, and are very good indeed; another excellent feature is the marking of the pronunciation of the accented syllables of technical words, which will no doubt in time help very much to a desirable uniformity in this respect.

C. J. S. B.

INSECT LIFE.—A monthly bulletin, published by the Entomologist and his Assistants in U. S. Department of Agriculture at Washington. Vol. I.—Nos. 1 to 4; July to October, 1888.

This new periodical, "devoted to the economy and life-habits of insects, especially in their relations to agriculture," is a very welcome one indeed. The four parts, of thirty pages each, which have thus far appeared, are filled with matter of great interest to both the scientific and economic Entomologist. With so able and experienced a staff as that at Washington, presided over by Dr. Riley, and with Field Agents at widely distant points, this new magazine cannot fail to be most useful, and to do good work in the spread of valuable and timely information.

C. J. S. B.

INSECTS FEIGNING DEATH.—We have received several more communications on this subject, but we do not think that any useful purpose can be served by their publication. The question is purely one of opinion and definition, and cannot possibly be authoritatively settled in one point of view or another.

Mailed December 8th.

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