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 *Tryphana*. 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 *Heliothians*, 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. Magnolii*. 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 *Eupsephopæctes*.

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 neururation 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*,² *Heliophobus*, *Ulochlena*, *Oxytrypia*, are yet without described American species. Guenée's *Chariptera festa* 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 *jaspidea*, but seems to be allied to *Dicopis*.

The genus *Oncocnemis* is a smooth, almost Agrotid form, considered by Herrich-Schaeffer as allied to *Heliopsis* 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 *xylinoides*. 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 to-day 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* m. (= *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 *Hydræcia* Guen. Now the type of *Hydræcia* is *micacea*, as cited in the Species Général. But the type of *Gortyna* is already designated by Hübner as *micacea*, consequently *Hydræcia* must fall. For *Gortyna* Led., with its one species *flavago*, which differs from *Hydræcia* 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 *Thyatirinae* correctly for the first time; he is the author of the leading generic divisions and names, *Apatela*, *Agrotis*, *Heliothis*, 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, *buffaloensis*, 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 ARCTINÆ.

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 ciliæ, 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,