

THE MALE GENITALIA AND THE SUBDIVISIONS OF
AGROTIS.

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It is forty years ago since Lederer used the male genitalia to group the European species of *Agrotis*. According to the latest general work on the subject, the 127 European species of *Agrotis* fall into nine groups, characterized chiefly by changes in the form of the male genitalic appendages. The failure to correlate these European groups with the American subdivisions of *Agrotis*, prevents me from considering Prof. Smith's recent revision as complete, since I have demonstrated the near relation between the two faunæ exhibited by *Noctuinae* of the Old and New World.

The characters drawn from the male genitalia must be ranked with those from the antennæ. They are sexual or secondary characters. On this account to use them as the sole basis for generic separation is hardly necessary. The genitalia in the *Noctuidæ* are found to differ markedly in otherwise very closely related species. In other species, easily distinguishable, they are practically of the same pattern. Undoubtedly we must know and study all the parts of an insect, but no single character will enable us to classify an order. It will be found as impracticable to classify the moths by their tails, as by their wings alone or chiefly, as attempted by Herrich-Schæffer. Among the representative species this change in the structure of the genitalic appendages is instructive and indicative of their morphological value. The European *Agrotis augur* is a well marked and tolerably isolated species, presenting peculiarities in shape, size, colour and pattern. In all these respects the American *Agrotis haruspica* is nearly its exact counterpart. As the basis of separation of the two, the immature stages not having been used, we have a tendency to obsolescence of certain markings and perhaps a hardly perceptible change in the exact shade and average size in *haruspica*. Now the genitalia are shown to differ in pattern as well. From this fact we must logically conclude that the genitalia are more easily impressed and changed by environment than colour, size and pattern, or other structure. Consequently the genitalia are subject to variation, and the question rather comes up, are the characters drawn from the male genitalia of specific value? The true ground for considering the two species distinct is that they do not interbreed and produce each other, and that

so far the American examples may be picked out by experts. When these conditions can no longer be fulfilled there would be no ground for retaining a different name. The mere fact of their inhabiting different continents is not sufficient, they must breed true to type and not produce each other. Then we can be sure we have to do with separate cycles of existence and we can catalogue the fact. As the genitalia are concealed, their structure is not so apparent, and it is clear that repeated observations are necessary to verify the statements drawn from solitary dissections. But granting what has been published as substantially reliable, there yet remains the test of breeding to be applied to the genitalic species. We have an instance in the genitalic species of *Nisoniades*. These butterflies have not been bred to ascertain if they remain true in their genitalic peculiarities, if one genitalic type does not produce the other, if the caterpillars show no differences. Until all these matters are cleared up we can arrive at no final conclusion as to the value of genitalic characters, as to which single observations must be checked by repeated experiments. Writers on the subject have apparently proceeded on the basis that the male genitalia are formed, not by deposits of chitine but of cast iron, moulded so as to fit and give at last a stable and firm reality to our artificial system of classification. Vain expectations! The characters, on which we are obliged to found all our categories, are one in quality and only differ in quantity; what is generic is specific also, and what is specific is varietal.

In my Buffalo lists, 1874-1876, I was at some trouble to give the generic types of the Noctuidæ, and my action, unless it can be shown that I was in any one case in error, is binding from those dates. Prof. Smith was, therefore, no longer free to retain *Peridroma* for *occulta*, as I accepted *Eurois* for that species, without showing my action to have been at the time unwarranted. To place my *A. pellucidalis* in the same "genus" with *occulta*, and on account of the genitalia, is not to be defended. The variability of the genitalia cannot be made a basis for generic separation nor their agreement for generic grouping without other characters. The two insects are strongly different in form and vestiture, the hindwings being in the *Anicla* group translucent, where I would refer my species. The work of Prof. Smith bears proof, from internal evidence, that the intention was at first to consider but one genus, *Agrotis*. Not only are the "genera" called "groups" in the body of the text on

occasion, but in the case of *Agrotis pellucidalis* the change of title has been forgotten. According to Hofmann the type of *aplecta* is *prasina*. I have made the following types of named subgeneric divisions: *occulta* of *Eurois*, *alabamæ* of *Anicla*, *lewisii-tessellata* of *Pleonectopoda*, *mærens-citricolor* of *Carneades*, *catherina* of *Matuta*. These must first be used before new titles are coined. There remains a literary research as to the oldest generic titles used in Europe for species of *Agrotis in sensu* Lederer, which is not in any sense a superficial assemblage, but a scientifically and properly assorted genus of *Noctuidæ*. The question as to the rank of the species with tuberculate clypeus may be separately considered. On my discovery of the character I made it, as elsewhere, the basis for a distinct genus. Had I had then the material and the time I would certainly have continued my observations and extended the limits of the genus, which has grown to unexpected dimensions in Prof. Smith's work.

In my Revised Check List I accepted several forms as varieties which Prof. Smith shows to be distinct species, thus reverting to my original opinion respecting them which I had incorrectly modified from information received subsequently. With regard to these and to the representative species, now definitely separated as distinct upon distinctions found in the male genitalia, Prof. Smith's observations may be accepted as corrections of my list. It is not my intention here to review the whole of Prof. Smith's brochure, merely to point out certain misapprehensions and, as I think, wrong identifications, which in the future, if uncorrected, may render the synonymy uncertain. Similarly I avoid any reply which might take the shape of controversy, confining myself to matters of fact, as I understand them, and referring the student to my published papers for all special cases of difference.

A prominent feature in Prof. Smith's treatment of the species is his referring names designating recognizable varieties as simple synonyms. Even when intermediary forms exist, as they do in very many cases of variation, the names for the extremes for the pronounced varieties, should be retained to designate them exactly. Colour varieties, as for instance the bright red *specialis*, in contradistinction to the olive-grey *Wilsoni*, *gularis* as distinguishable in a similar way from *ochrogaster* (*turris*), might, with advantage, be designated. In a few instances where the differences remain, in my opinion, of specific value, the names are made equally synonyms. The most prominent instances of this are

Clodiana, Essay fig. 10, and *semiclarata*, Essay, fig. 9. This latter is smaller and slither, bright reddish-brown, with a thick black basal dash absorbing the long claviform, the hindwings dark above, beneath half-pale. The former is stouter, obscure purplish-brown with a yellow tinge, the male with yellow streaks; the claviform is reduced, no black basal dash, hindwings soiled white with diffuse terminal shadings, beneath wanting the character of *semiclarata*; the female is still more obscure, the markings of primaries lost. The differences between these two forms seem certainly specific. In the Check List I have besides accorded specific rank to the following names, which in the revision are put down as varieties or synonyms: *Brunneipennis*, *orbis*, *latula*, *cloanthoides*, *balanitis* and *verticalis*. As regards *brunneipennis*, I incline to believe that we may have a second eastern species smaller than *cupida*, and variable in colour. The larger specimens from Texas are published with the use of my description by Prof. Smith, under the name *Belfragei*, and probably this is the correct view. From Prof. Lintner's remarks it seems that *cupida* is more constant in size than I thought it, although more variable in colour.

As to *orbis* and *latula*, they are referred by Prof. Smith as synonyms of *cupidissima*. But what Prof. Smith describes as *cupidissima* is most certainly not that species but *orbis*. *Cupidissima* is really and originally founded on three specimens with open orbicular and faint, shaded markings. A fourth, which had no discernible markings, need not concern us here. I thought it a variety. I cannot account for the statement that I have confounded two distinct species, one with the orbicular open, the other with the orbicular closed. Most assuredly, so far as I can see and remember, and both originally in the CANADIAN ENTOMOLOGIST and subsequently in the bulletin of the U. S. Geol. Survey, I have described *cupidissima* with the orbicular open. On the other hand I had only the type of *orbis*. This is a smooth olive-gray species, with slightly paler terminal field, and which may be held the Californian representative of *alternata*. The orbicular is small, spherical, pale-ringed; the closed round orbicular suggested the name *orbis*. I am quite confident that *orbis* and *cupidissima* are distinct species, while it is almost certain that Prof. Smith has failed to recognize *cupidissima* under my name for it, while both this and *latula* may figure as new species in the section of *Rhyncagrotis* with open orbicular. As to *cloanthoides*, Prof. Smith says *albalis* of Dr. Bailey's collection looks like a washed-out specimen of

cloanthoides. I have no special knowledge now of the specimen referred to, but I believe the Nevada specimens of *albalis* are distinct. The types in my own collection were fresh, with a white bloom, very different from the smooth strigose *cloanthoides* from Colorado, which is darker. There was nothing "washed out" about my material. As to *balanitis* it differs from *messoria* by the abdominal line, the different maculation and course of t. p. line, all specific characters. As to *verticalis*, the fact as to whether it be distinct, or only a constant form of *designata*, must be determined by breeding; I thought it distinct. In other cases, I believe Prof. Smith's large material has enabled him to properly correct the synonymy of the list.

I would certainly retain the name *tricosa* of Lintner. In my New Check List of 1882 I say, in a note to this species, p. 24: "This form should perhaps bear Guenée's name, being later separated from Guenée's *jaculifera* than *herilis*. The typical form of *jaculifera* exactly corresponds to *subgothica* of Stephens." And Prof. Smith, without giving me credit, prefers the name. Mr. Butler says positively, according to Prof. Smith, that *tricosa*, Lint., is typical *jaculifera*. Now Guenée happens to figure typical *jaculifera* and he figures typical *subgothica*! Prof. Smith does not quote Guenée's illustration, which contradicts both Butler's statement and his own course. Guenée's types of "*jaculifera*" or so-called "types," were several in number at least, as he included two other species as varieties. One of these so-called types Mr. Butler may have and this may be a *tricosa*, Guenée's var. A. Guenée made three mistakes as to his material: first he described and figured *subgothica* as *jaculifera*; then he described specimens belonging to two different species, *tricosa* and *herilis*, as varieties of *jaculifera*. Under no circumstances can Butler's statement be correct, while I submit that it is unfair both to Prof. Lintner's acumen in contradicting the conclusions of Guenée and the figures of "The Practical Entomologist," and to an exact interpretation of the names, to resuscitate *jaculifera* at the expense of *tricosa*.

Agrotis morrisonistigma, Grt.—According to Prof. Smith, Mr. Morrison's so-called "type" of this species does not agree with the specimens returned me by Mr. Morrison. The species figured by me as *exsertistigma*, will therefore have to be known by the name *Morrisonistigma* proposed by me in Buffalo Bulletin for this eventuality. The "types" of *exsertistigma*, Morr., came originally from me, and it appears that Mr.

Morrison has distributed different species under this name. As I figure one of these, the name might have been allowed to remain as fixed by me. Since Prof. Smith has overturned my determination of course the above name must be used and not a new one as attempted in the "revision."

In conclusion, *Agrotis costata* is a near and close ally of *idahoensis* and does not belong with the *cupida* group. I have always associated the two, describing in fact the latter comparatively with the former, of which I had but a single poor specimen, though in my lists I have placed the two together wrongly. The description was misplaced, and the words "resembles the preceeding" become thus misleading. But the description is clear enough; it is a species with pallid costa, hence the name. I hope that figures may be obtained of my types in the collection of the British Museum not known to Prof. Smith, so that every point may be cleared up. As these unknown species are, proportionately speaking, few, there should not be any great difficulty in the matter.

DESCRIPTION OF A MUSCID BRED FROM SWINE DUNG, WITH NOTES ON TWO MUSCID GENERA.

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On Dec. 14, 1890, I secured from the upper Piney Branch region (District of Columbia) a small quantity of swine dung that had been dropped in the edge of open woods, and seemed to be old enough to contain with probability larvæ or puparia of Diptera. This was placed in a large glass jar, with a few inches of sand in the bottom, occasionally moistened and kept in a moderately cool room in the house. The dung was soon noticed to be full of larvæ, which in a short time crawled out of it entirely, clustered on the inside of the glass, or worked themselves down into the sand, manifesting a considerable migratory instinct, no doubt induced by the moisture and mild temperature. Up to Feb. 1st about a dozen specimens of the perfect fly had issued, there being only one species. It belongs to the genus *Cleigastra* in the *Cordyluridæ*.

This genus, in the sense of Schiner, differs from *Cordylura*, for which it might easily be mistaken, by having the arista naked or only short pubescent, and the wings very distinctly longer than the abdomen.