III TAXONOMIC VALUES IN CULICIDÆ

By E. BRUNETTI.

Since the connection between mosquitoes and malaria was definitely established a few years ago, numerous writers (medical, anatomical, biological, economical and so on,—practically everything but dipterological) have appeared, probably attracted by the economic aspect of the question. It is to be regretted that hardly any of these have possessed any general entomological knowledge, and the natural consequence has arisen; the differences between the various forms have been so grossly exaggerated taxonomically that a few years more progress at the same rate might see the Culicidæ elevated to the rank of a Sub-kingdom, with classes, subclasses, orders and so on. The absurdity of even the present state of things is so self-evident to everyone with a general knowledge of Diptera combined with some acquaintance with taxonomic values in other orders also, that a serious protest seems imperative.

The critical observations contained herein are not intended as any attack on what our American contemporaries amiably designate "mosquito sharps," but as a real and earnest protest against the utter disregard to zoological value and stability exhibited in the creation, on characters often of quite minor importance, of hosts of new "genera" and even "sub-families," to say nothing of species, the latter being a point on which opinion may for the present be reserved.

Prof. Williston is, so far as I am aware, the only systematic dipterologist to endeavour to stem the tide of irresponsible additions to the literature of this order,[1] but apparently with little success, and it seems incumbent on me to support dipterological opinion, having associated myself, at least clerically, with the Culicidæ of the Orient.

His most instructive paper should be carefully read by all, because the whole subject is presented with the greatest moderation yet with absolute conciseness, in spite of the present condition of things in this family being calculated to cause considerable irritation to the systematist.

To quote a few of his more pertinent observations, it is important that of the present-day writers on mosquitoes nearly all are non-dipterologists, "some indeed, whose only papers on entomology have been those proposing new subfamilies!"

"Their ignorance of related Diptera has more than once been deplorably shown by writers on the Culicidæ" and he observes "no one is competent to discuss philosophically the classification of any group of animal life, who is not well grounded in the principles of taxonomy as applied to related animals," for "the mosquitoes

1 "The Classification of the *Culicidæ*," Can. Ent., xxxviii, 384.

are not organisms isolated from all other living creatures,'' though it would appear as if recent-day writers thought so.

Regarding the erection of new sub-families, the writer (who must be regarded as certainly one of America's leading dipterologists) is naturally even more severe. '' Think of it, a subfamily distinguished ultimately by ' broad ' or ' narrow ' wing-scales '' and he regards, justly with dismay, that character or its equivalent being used singly as a sub-family character in other families. He therefore rejects, naturally enough, such divisions, mentioning the case of the *Heptaphlebomyinæ*, erected on the bare character of the presence of scales on the 7th vein in the wing ! He also declines to separate *Corethra* from Culicidæ, and is disposed to include *Dixa* also in the family.

Messrs. Dyar and Knab, in a general criticism of the too hasty erection of genera on unstable or weak characters,[1] say, referring to the construction of genera on secondary sexual characters. '' While the separation of genera on such characters may have been allowable (for even yet, many systematists found genera on secondary sexual characters) their elevation to higher groups and sub-families, as has been done by Theobald and his followers, is indefensible. We are unaware of any other case where authors have presumed to found sub-families on secondary sexual characters in normal bisexual animals. * * * As the characters have really no fundamental importance whatever, it is not surprising to find that they tend to insensibly intergrade.''

Nevertheless, these workers in Culicidæ propose (Can. Ent., xxxix, 47) a system of classification by which they divide the family into two parts, the *Culicini* and the *Sabethini* ; but, whilst rejecting the use of the length of the palpi as a means of primarily dividing the genera, they adopt other characters which seem to have considerably less value still ; namely the presence or absence of setæ on the metanotum, the presence or absence of a ventral brush on the anal segment of the larva, and the number of setæ in a microscopic structure in the form of a comb or '' scraper '' situated at the end of the tibia !

They, however, sink a number of the recently established genera, including several of their own, as synonymic with some of the older ones, and this fact might have been hailed with satisfaction as possibly the beginning of a return to a more rational view of the members of this family.

Thus, to deal with Oriental genera only, they absorb *Myzomyia*, Blanch., and *Cellia*, Theob., in *Anopheles*, Mg. ; *Theobaldinella*, Blanch., in *Culiseta*, Felt ; *Grabhamia*, Theob., in *Howardina*, Theob., and *Culicada*, Felt, in *Ædes*, Mg., *Melanoconion*, Theob., in *Culex*, *Dendromyia*, Theob., in *Wyeomyia*, Theob.

Their suggested synonymy has, however, not been adopted by subsequent authors.

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[1] "Notes on mosquito work,'' Can. Ent., xl, 309 (1908).

Whilst it is not proposed that the palpi are inviolable characters on which to form higher groups, they are generally considered of much taxonomic importance generically throughout the order, and are, apparently, from a systematic point of view, equal to the best other characters available in Culicidæ, if used with moderation and if the number of genera is kept within reasonable limits. The *Tipulidæ* are often divided into the *Longipalpi* and *Brevipalpi*, these divisions being considered by the late Osten Sacken (one of the soundest dipterologists and the highest authority on Tipulidæ) as of supra-sub-family rank. It is true that Loew (whom I consider actually the greatest dipterologist the world has yet seen) noted that the classification is not entirely a natural one, but even if regarded in this family as of partly artificial character it is tolerably consistent.

Moreover, the two sub-families (families, according to the recent Catalogues, with which I cannot agree) *Tipulinæ* and *Ptychopterinæ*, embraced by the *Longipalpi*, certainly *are* natural divisions; and the several sections or groups (sub-families according to some) of the *Brevipalpi*, comprising what I regard as the *Limnobiinæ* sub-family, are also tolerably well-marked divisions. An exception or two does not invalidate the use of a character, and the failure of the palpi to satisfy those desiring very distinct limits to their "genera" shows on what uncertain ground such "genera" stand.

"All the sub-families of the *Culicidæ* recognised by the Theobaldian school are untenable, including the *Anophelinæ*," say Messrs. Dyer and Knab, and to this view at least the present writer can cheerfully accord his assent.

Lutz[1] even invents terms for already established divisions, such as his *Euculicidæ* and *Culicimorphæ*, corresponding respectively to the old groups of *Culicinæ* and *Corethrinæ*.

Moreover, the adoption of a term ending in '*dæ*' is wholly inadmissible for any rank except that of a true family.

He further subdivides into *Asiphonatæ* and *Siphonatæ*[2] according to the absence or presence of a respiratory siphon in the larva; with still further sections and subsections, each with a special name, all of which seems unnecessarily encumbering the science with multitudes of new names to little purpose. Such groups and sections are sufficiently designated by mere letters or figures in a preliminary analytical table of genera.

Criticising Miss E. G. Mitchell's paper on "The classification of the *Culicidæ*" (Can. Ent., xxxix, 198) I can only repeat that she adopts the same erroneous line of thought common to all specialists in the family, that is, the over-valuation of minor characters. As a matter of personal opinion I fail to see sufficient justification for any further subdivision of the family than the *Culicinæ* and

[1] "Mosquitos do Brasil" (Bourroul).

[2] Already practically preoccupied in Lamellibranchiata by the *Asiphoniata* and *Siphoniata*.

Corethrinæ; but in my compilatory work, the *Anophelinæ* and *Ædeomyinæ* were accorded sub-family rank, merely in deference to specialists (as was distinctly stated in my reply to Messrs. Dyer and Knab's criticism of my Oriental Catalogue, Can. Ent., xli, 121).

These groups were presumably differentiated as follows: *Anophelinæ*, palpi long in ♂ and ♀; *Culicinæ*, palpi long in ♂ short in ♀; *Ædeomyinæ*, palpi short in ♂ and ♀; *Corethrinæ*, proboscis short and not formed for biting, which separates this sub-family from the other three.

No doubt the genera of intermediate nature efface the dividing lines between these sub-families, which only supports the plea that no true separation exists except between the *Culicinæ* and *Corethrinæ*. Miss Mitchell echoes writers on mosquitoes only, in asking "why should the *Corethridæ* be placed in *Culicidæ*," and in referring to both groups as "heterogeneous elements."

Replying to this it may be remarked that *Corethra, to the systematic dipterologist, has always been in Culicidæ*, where, I maintain, it must most certainly still remain, as in its natural affinity. To compare it with *Simulium* is quite wrong, the two genera having nothing in common. Most of the workers in mosquitoes forget that venation is one of the soundest characters in classification, and that *Corethra* has a venation identical with *Culex*.

The absence in the former genus of the stiff proboscis formed for piercing, characteristic of the *Culicinæ*, does not necessitate the elimination of the genus from Culicidæ.

Stomoxys and its allies have a stiff piercing proboscis, yet they have been admitted till recently merely as a group of genera in the sub-family *Muscinæ* In Girschner's rearrangement of groups in Muscidæ *s. lato* the *Muscinæ* sub-family is suppressed but *Stomoxys*, etc., are none the less afforded generic rank only, and incidentally it may be noted that with this new sequence of genera in Muscidæ I cannot possibly agree. *Drymeia* has also a stiff proboscis, yet is merely an exceptionally structured genus of Anthomyidæ.

Other genera in other families could also be cited.

The methods of depositing the eggs, the anatomy of the stomach, the minor characters of the larvæ, and in fact, all the features emphasized by Miss Mitchell, would be regarded by systematic dipterologists as subservient to, for instance, venation, and any bodily structure in the adult of a much higher nature than the variation of organs known to be subject to the greatest differentiations.

To borrow again from Williston's article, "The three or four new families that have been proposed in recent years, all of them with more distinctive characters than the *Corethrinæ* possess, have been unanimously rejected by dipterologists."

Besides, many of the points urged by Miss Mitchell are flatly denied shortly afterwards by Mr. F. Knab, in the same Journal (Can. Ent., xxxix, 349).

Mr. Knab's reply to Miss Mitchell's article calls for little comment here as it mainly consists of refutations or doubts of

the statements made by the latter author concerning the life history of various Culicidæ as compared with species of Chironomidæ, Psychodidæ and *Dixa*. As I am personally unacquainted with the earlier stages of any of these genera, it would be presumption to decide "when doctors disagree," but I have seen no reply to Mr. Knab on the subject, and his facts appear well founded.

Regarding *Dixa*, it has always been regarded as somewhat abnormal; to me personally it appears intermediate between Tipulidæ and Culicidæ.

The excuse for the erection of such a number of new genera, and the splitting up of the Culicidæ into several sub-families, is usually the unwieldiness of the genera, which otherwise would contain such a large number of species in each.

As it is well known to be a common thing for students to determine the species first, and discover its genus afterwards, the instability of most of the genera is surely emphasized, as the present writer never heard of this method of determination being followed in any other group.

Moreover it is entirely wrong, scientifically, to consider that the presence of a large number of species in any genus is sufficient justification for dividing it into several others and according them equal value. A genus, as Prof. Williston truthfully says, should be something more than a second name for a species, or a cognomen established for convenience' sake only. "A genus is a concept" is written in the late Baron Osten Sacken's handwriting, inside the covers of his hand-copy of Aldrich's Catalogue of North American Diptera (now in the possession of the Indian Museum), and it should have a real zoological value and significance; all genera throughout the animal kingdom being theoretically more or less on the same plane of systematic value. Personally, I object to all classification which is not as nearly as possible a natural one, and purely artificial groups should at the very outside attain only the rank of subgenera.[1]

The plea of the unwieldiness of extensive genera cannot be upheld, as the systematist is quite accustomed to such genera. In the first five volumes of the Catalogue of Diptera now in process of publication by Prof. Kertesz, are to be found numerous such genera, with approximately the following number of species each: *Mycetophila* 190, *Sciara* 460, *Chironomus* 320, *Culex* 182 (up to 1920), *Cecidomyia* 180, *Dasyneura* 160, *Tipula* 310, *Odontomyia* 160, *Chrysops* 150, *Pangonia* 180, *Anthrax* 460, *Exoprosopa* 230, *Bombylius* 240, *Asilus* 260, *Promachus* 150, *Laphria* 230, in addition to nearly twenty others with a little over or a little under 100 species in each; the whole triumphantly capped by the gigantic genus

[1] An objection to "preliminary descriptions," often of a few lines or words only, may suitably be here recorded. It seems doubtful whether priority can justly be claimed in such cases, the full descriptions being often long delayed; though I recognise the awkwardness of the situation in deciding whether a "preliminary" description is of sufficient length to stand good or not.

Tabanus with 912, a genus in which over and over again abortive attempts have been made to dismember it successfully.

The real cause of the undue inflation into genera of what should be merely groups of species, and the elevation of a few of such so-called genera into sub-family rank is the general absence of knowledge of the other families in Diptera in the present-day writers on Culicidæ. Williston has already been quoted on this subject.

Therefore, in his remark that "triviality has reached its limits" (referring to the slender characters on which so many genera have in recent years been established), I cannot but entirely concur: this without any individual reproach to workers in mosquitoes, many of whom have been most courteous to me personally.

It is almost certain that a wider knowledge of the accepted zoological value of such terms as "family," "sub-family," "genus," etc., would convince them of the grossly exaggerated value attributed by them to what the systematic dipterologist would term quite secondary characters.

In short, if any culicidologist would have the patience, before making new genera and sub-families, to read up some of the systematic dipterological literature of the last 60 or 80 years, more especially the tables of genera in the various families of Diptera, contained in Schiner's Fauna Austriaca (than which no better standard work on the order has ever been issued)[1] he would find the greatest varieties of forms, not only in antennæ, palpi, genital organs, exterior covering (whether scales, hairs, bristles, spines or otherwise), proportionate parts of the body and so on, but in venation also; all this in the same family, yet in spite of the hundreds of new species erected yearly, all attempts to create new families and sub-families on slender characters meet with strenuous opposition.

It may be remarked here, although the subject will be treated more fully in the forthcoming Supplement to my Catalogue, that recent writers on this family appear to depart deliberately from biological precedence in the methods of presenting the results of their studies to others, with the result that the consultation of their writings is unnecessarily rendered materially more difficult. This is chiefly in their method of quoting from other authors; in the indices, and the undue prominence given to the ♀ .

In the present paper however the only object has been to call attention to the instability of the great bulk of the generic and higher divisions recently proposed in this family.

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[1] The examination of these tables alone forms, perhaps, the most comprehensive yet concise method of obtaining a rapid insight into the principles of classification in this order. They may be with advantage supplemented by the equivalent tables relating to North American genera, contained in Prof. Williston's admirable manual "North American Diptera," 2nd Ed.