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A Phylogenetic Study of the Thoracic Sclerites of the Psychodoid Diptera, with Remarks on the Interrelationships of the Nematocera.

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(Continued from page 38.)

The Tanyderidae and such Psychodids as *Bruchomyia* are extremely primitive Diptera, and in many respects, the Psychodoidea are as near the type ancestral to the rest of the Diptera, as any known forms. On the other hand, none of the Psychodoidea of which we have any knowledge, has a meral region not completely fused with the lower portion of the epimeron in the mesothorax, and since the fused condition represents a considerable degree of specialization, this and other specializations (such as lack of ocelli etc.) preclude our regarding the Psychodoidea as the common stock from which the rest of the Diptera have sprung. The most that can be said of the Psychodoidea in this respect, is that they have retained as many ancestral characters as any Diptera have, and in making a "phylogenetic tree" of the Nematocera, such as that shown in Fig. 12, the lowest place might be assigned to the Psychodoidea.

The Tipuloidea, including the families Tipulidae and Limnobiidae—and possibly the Trichoceridae also, although the latter are extremely close to the Mycetophiloid family Anisopodidae—are likewise extremely primitive Diptera, and if the Trichoceridae be included among them, some have retained the ocelli lost in the Psychodoidea. The Tipuloidea however, are also specialized in many particulars (although some of them have retained the meron as a distinct sclerite still adherent to the middle coxa) and cannot be regarded as the common stock from which the rest of the Diptera were de-

rived. We are apparently justified in stating that the Protodiptera such as *Aristopsyche* represent as nearly as any known forms, the ancestral stock of the Diptera, and from this common stock, the first lines of development to branch off were the Psychodoid line (at whose base are such forms as *Macrochile*) and the Tipuloid line, at whose base are such forms as *Architipula*, etc. As Dr. Alexander points out, the Architipulidae (and the Cylindrotomine Tipuloids) are annectant between the Limnobiine and Tipuline types, and he is inclined to regard the Limnobiidae as merely a subfamily of the Tipulidae. German Dipterists, however, generally recognize the family Limnobiidae, and there is considerable to be said in favor of the latter view.

The Trichoceridae are at the base of the line of development leading to the Anisopodidae and other "Mycetophiloid" types, and it is very difficult to determine whether the Trichoceridae are Tipuloids or "Mycetophiloids." Dr. Alexander tells me that the larvae of the Trichoceridae are remarkably similar to those of the Anisopodids, in being eucephalous and amphipneustic, and in this respect the Anisopodids and Trichocerids are quite different from the true Tipuloids, and are on the side of the "Mycetophiloids." I do not know where the Trichocerid line of development could have come off from any known Tipuloid or Psychodoid type, since the Trichocerids have well developed ocelli and other primitive features lacking in the Psychodoids and Tipuloids. The ancestors of the Trichocerids were apparently some form related to the Protodiptera, and at present this is all that we are justified in saying concerning their ancestry. In their general habitus, the Trichoceridae are Tipuloid, but they have so many features in common with the Anisopodidae that it might be preferable to group them in the same superorder with the Anisopodidae, which were undoubtedly descended from *Trichocera*-like ancestors.

The Anisopodidae are so closely connected with the "Mycetophiloids" such as *Mycetobia*, *Sciara*, etc., that it is necessary to include the Anisopodidae (the old family "Rhyphidae")

in whatever superfamily includes the Mycetophilidae. *Mycetobia* is anatomically annectant between the Anisopodids and the rest of the "Mycetophiloids" and Mr. Edwards believes that *Mycetobia* is actually an Anisopodid, while other Dipterists have claimed that *Mycetobia* is a Mycetophilid. Anatomically, there is no doubt of its annectant character, and because of the synthetic nature of *Mycetobia* I have no hesitancy in grouping the Anisopodidae in the same superfamily with the Mycetophilids. The adult Anisopodids are more primitive, anatomically, than any Mycetophilid,* so that they must be regarded as occupying a position at the base of the "Mycetophiloid" line of development; and, in fact, the adult Anisopodidae are anatomically astonishingly similar to what we know must have been the type ancestral to the rest of the Nematocerous lines of development presently to be discussed.

The Itonididae (Cecidomyiidae) were undoubtedly descended from Mycetophilid-like ancestors, and hence should be grouped in the same superfamily with the Mycetophilids. Furthermore, such forms as *Plecia*, which is either a Bibionid, or is extremely close to the Bibionids, is anatomically just like *Hesperinus*,

* As every student of comparative anatomy knows full well, living things exhibit "heterospecialization (*i. e.*, they are not uniformly specialized in all particulars and may retain some rather primitive features, while they are much more highly specialized in other respects); and a group "B," for example, may retain a single feature in a more primitive condition than is true of the same feature in another group "A," which in general is much more primitive than group "B." This is well illustrated in the feature of respiration in the larvae of the Mycetophilid and Anisopodid groups, which have a common ancestry. Larval Mycetophilids, being peripneustic, are in this one respect more primitive than are the larval Anisopodids and Trichocerids, which are amphipneustic. In other respects, however, the Anisopodids and Trichocerids are much more primitive than the Mycetophilids are; consequently, it would be folly to assign to the Mycetophilids a lower position in the evolutionary scale, in deriving all of these forms from an ancestry from which the Anisopodids and Trichocerids have departed much less (in general) than the Mycetophilids have.

and both of these genera are extremely like *Pachyneura*, which Mr. Edwards thinks is an Anisopodid, and all of these genera are very like the Anisopodids *Olbiogaster* and *Lobogaster* in numerous anatomical details. These insects connect the Bibionids so closely with the Anisopodidae, and the Mycetophilids intergrade with the Anisopodidae so markedly, that there can be no doubt that the Bibionids and the Mycetophilids (with the Itonidids) were descended from Anisopodid-like ancestors; and I would unhesitatingly group together the Bibionids, Mycetophilids and Itonids in a single assemblage to which the superfamily designation Bibionoidea might be applied.* The only question in the matter is where to place the Trichoceridae, which are like the ancestors of the Anisopodids. The Anisopodids themselves are undoubtedly "Mycetophiloid" in character (*i. e.*, should be grouped among the Bibionoidea) but the Trichocerids have remained so like certain Limnophiline Tipuloidea in many respects, that it is extremely difficult to decide whether to place them with the Bibionoidea, next to the Anisopodidae, or to leave them with the Tipuloidea. As Dr. Alexander points out, the amphipneustic, eucephalous larvae of the Trichoceridae are remarkably like those of the Anisopodids, and they differ from the typical Tipuloid larvae, while the adult Trichocerids have ocelli, which are lacking in the Tipuloids and the typical Tipuloid "V-shaped" suture is practically wanting in them. Dr. Alexander, however, is inclined to regard the Trichocerids as true Tipuloidea, and the opinion of such an authority on the group Tipuloidea is worthy of the utmost consideration. My own inclination would be to group the Trichoceridae with the Anisopodidae in the superfamily

* There is considerable need of a group intermediate in rank between a superfamily and a suborder, to contain the superfamilies Mycetophiloidea and Bibionoidea, since these superfamilies, although extremely closely related, are nevertheless quite distinct. Since there is no such group of which I have any knowledge, I have "lumped" the superfamilies Mycetophiloidea and Bibionoidea into a single unwieldy "superfamily" Bibionoidea (*sensu lata*) in order to express the close relationship between the two.

Bibionoidea, and in any case, I would place the Anisopodidae in the superfamily Bibionoidea, irrespective of the Trichoceridae, leaving the ultimate disposition of the Trichocerids to be finally determined when a wider knowledge of the types connecting them with their nearest relatives has been gained.

The Simuliids, Thaumaleids (Orphnephilids), Chironomids, Dixids and Culicids could readily be grouped in a single assemblage or superfamily, the Culicoidea, whose line of development arose from the Anisopodid-like ancestors of the Bibionoidea, as is indicated in the diagram of the phylogenetic tree in Figure 12.

The origin and affinities of the Blepharocerids are still a mystery, and the Blepharocerids form such an isolated group, that it is preferable to consider them as constituting a distinct superfamily, the Blepharoceroidea. It is extremely probable that the Blepharocerids arose from ancestors allied to the Anisopodid-like common ancestors of the Culicoids and Bibionoids.

In brief, we may say that there were three main lines of development leading from ancestors like the Protodiptera, as is indicated in the "tree" shown in Figure 12. One of these lines of development (with *Macrochile* at its base) leads to the Psychodoids; another line (with *Architipula* at its base) leads to the Tipuloids; and a third line (with the Trichocerids at its base) leads to the Anisopodid-like forms in the group Bibionoidea. The Culicoidea were apparently derived from Bibionoid forms, and the Blepharocerids were probably derived from a similar source.

Since the Tipuloids and Psychodoids are the most primitive representatives of the Nematocera, they might be grouped together in an assemblage to which the old designation Polyneura, used in a new sense, might be applied—or if confusion would arise from this peculiar usage, they might be called Protonematocera, since they are the most primitive of the Nematocera. The rest of the Nematocera (*i. e.*, the Bibionoids, Culicoids and Blepharoceroids) might then be designated by the old term Oligoneura, used in a new sense—or if this unaccustomed usage of the term would give rise to confusion, they

might be called Eunematocera. This grouping, and the arranging of the Nematocerous families in natural assemblages expressing their phylogenetic development more accurately, seems preferable to the older arrangement which did not take into consideration the various interrelationships of the lines of descent of the Nematocerous families.

The Entomological Observations of John Esquemeling, Buccaneer, on the Island of Hispaniola in 1666.

By HARRY B. WEISS, New Brunswick, New Jersey.

The firm of George Routledge and Sons, Ltd., of London, has recently reprinted as one of their *Broadway Translations*, the "Buccaneers of America, a true account of the most remarkable assaults committed of late years upon the coast of the West Indies by the buccaneers of Jamaica and Tortuga, both English and French, wherein are contained more especially the unparalleled exploits of Sir Henry Morgan, our English Jamaican hero, who sacked Porto Bello, burnt Panama, etc.," by John Esquemeling, "one of the Buccaneers who was present at these tragedies." In 1914, Esquemeling's account was published by Stokes under the title "Pirates of Panama or Buccaneers of America," edited and illustrated by G. A. Williams and very likely there have been other previous printings in this country, but the entomology in the account has remained in obscurity.

According to Mr. William Swan Stallybrass, the editor of the first account mentioned in these notes, Esquemeling's narrative was written originally in Dutch and published in Amsterdam in 1678, under the title "De Americaenische Zeerovers." In 1681 a Spanish translation appeared under the title "Piratas de la America" by Alonso de Buena-Maison, M.D., and this was followed by translations into other European languages. The *Broadway Translation* edition is a reprint of the first and second editions of the English translation printed in London in 1684.

Nothing appears in the standard encyclopedias about John



Crampton, Guy Chester. 1926. "A phylogenetic study of the thoracic sclerites of the psychodoid Diptera, with remarks on the interrelationships of the Nematocera." *Entomological news* 37, 65–70.

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