

ART. XXXIII.—*Descriptions of Tertiary Insects*; by  
T. D. A. COCKERELL.

PART III. [Continued from p. 232.]

(8) *Fossil Diptera of the Family Nemestrinidæ.*

THE Nemestrinidæ constitute a small but exceedingly interesting family of brachycerous Diptera; called by Comstock the tangle-veined flies. (The spelling Nemistrinidæ, in Comstock's Manual, is a mistake.) Among the Brachycera they appear to have certain primitive characters: palpi (always?) 3-jointed; antennæ with a jointed terminal appendage; wings with comparatively simple and direct veins. The last statement seems at variance with that of Sharp, who says, "the wing nervuration is perhaps the most complex found in the Diptera, there being numerous cells at the tip, almost after the fashion of Neuroptera." The apical reticulation of the wings, such as is described in the South African *Megistorhynchus*, does not occur in the fossil species examined by me, and may be supposed to be secondary to the venation proper, though perhaps suggestive of an ancestral character. Comparison is suggested with the Blepharoceridæ.

That the Nemestrinids are actually of great antiquity is shown by the remarkable fossil *Prohirmoneura jurassica* Handlirsch.\* This insect was found in the Jurassic rocks of Bavaria, and if Handlirsch's interpretation of the venation is correct, it seems to suggest that Comstock's nomenclature of the veins in modern forms may need amendment. It is with hesitation that I base an argument on this little-known fossil; but in any event the discussion may serve to illuminate the readily visible characters of the later remains from the Miocene.

The figure of *Prohirmoneura* exhibits the following characters:

(1) A strong subcostal vein, extending nearly to the end of the wing, where it bends upwards and joins the costa.

(2) A radius, arising from the subcosta very near its base, running nearly parallel with it, but ending near the tip of the wing, not curving upwards at its apex.

(3) A radial sector, or second radius, parallel with and close to the radius, and not confluent with it basally,—but this last character may be considered doubtful.

(4) A media, branching in the apical field, and connected with the radial sector by two cross-veins, the first directed obliquely inwards, the other in the reverse direction.

(5) A cubitus, arising from the media not far from the base, and branching near the middle of the wing, the branches run-

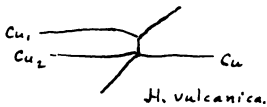
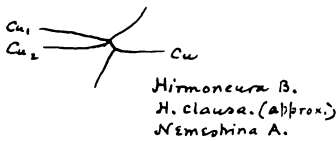
\* Die Fossilen Insekten, Part IV, 1906, p. 633, pl. li, figs. 11, 12.

ning parallel. Two cross-veins extend from the media to the hind margin, crossing the cubitus; the first crossing at its point of forking, the second (which is continuous with the second radio-medial cross-vein) far beyond.

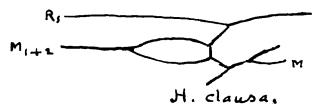
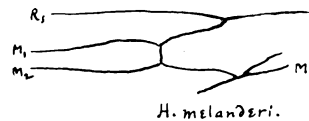
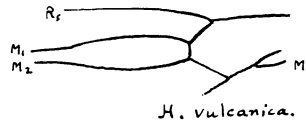
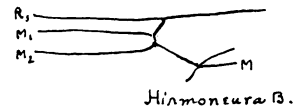
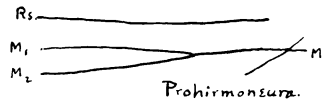
(6) Two simple anal veins, the cubital cell open.

(7) A very large alula.

This arrangement, which is not very different from that of various modern Nemestrinids, strongly suggests that the apparent cross-veins are really such, and are not to be interpreted



Branching of the cubitus.



Branching of the media.

as longitudinal veins deflected out of their course; *with the exception of the cross-vein seen in modern species at the branching of the media*, which is deflected M, whereas the oblique vein reaching it from  $R_1$ , and looking like a branch of the latter, is nothing but a cross-vein, which is either absent or obliterated in *Prohirmonoura*. The cubital cell is thought of as extending nearly or quite to the apex of the wing, and being twice broken by cross-veins (not branches of the cubitus), so that there are three posterior cubital cells, and two between the forks of the cubitus.

The Nemestrinids are divided into two groups,—those with, and those without, an elongate proboscis. *Palembolus florigerus* Scudder, described many years ago, from the Florissant shales, belongs to the first group: the two fossils now before me belong to the second. It is not possible that either of the latter represents *Palembolus* with the proboscis broken off or concealed, as the venation does not by any means accord with Scudder's description. I saw the type of *Palembolus* in the Museum of Comparative Zoology last summer, but, as I now much regret, I made no detailed examination of it.

The new fossils are:—

(1) *Hirnoneura melanderi* n. sp. Miocene shales of Florissant, Colorado, Station 14 (*W. P. Cockerell*, 1907). Length about  $15\frac{1}{2}$ mm, with the apical segments of the abdomen extended, so that the chitinous rings are separated; body black, wings hyaline, slightly dusky; width of head  $3\frac{2}{3}$ mm; of thorax 5mm; of abdomen about middle  $4\frac{1}{3}$ mm; length of wing 10mm. Named after Prof. A. L. Melander. Holotype in Yale University.

(2) *Hirnoneura vulcanica* n. sp. Miocene shales of Florissant (*Mrs. Charlotte Hill*). In Yale University Museum. Smaller and more slender; length about 12mm; head and thorax at least mainly black; abdomen dark brown (probably reddish in life), the hind margins of the segments having broad entire light bands, about one-third the width of the segments and extending more or less forwards at the extreme sides; a fine dark line borders the extreme hind margins; width of head and thorax each about 3mm; of abdomen about middle 4mm; wings hyaline, very faintly dusky, 11mm long. The wings are much longer in proportion to the insect than in *H. melanderi*. Holotype in Yale University Museum.

*Palembolus florigerus* is 19mm long, with wings 12mm; proboscis  $12\frac{1}{3}$ mm. In describing the venation I compare the fossils with three living species:—

(3) *Hirnoneura clausa* Osten Sacken. Texas. This is the species figured in Comstock's Manual, p. 460, as *Rynchocephalus sackeni*. I am indebted to Professor A. L. Melander for the correction.

(4) *Hirnoneura* B. A new species from Texas, of which I have the drawing of the wing, very kindly furnished by Prof. Melander.

(5) *Nemestrina* A. An undescribed species from Turkestan, of which a figure has been kindly sent by Prof. Melander. The Nemestrinids are to-day comparatively numerous in Turkestan and the adjacent regions, although so rare in North America.

The wing-characters may be best understood if taken one by one:—

(1) *Costal cross-vein* is barely beyond upper insertion of first radio-medial cross-vein in *Hirnoneura* B. and *H. melanderi*.

*deri*; a little more basad in *Nemestrina* A., and distinctly more apicad in *Hirmononeura clausa*.

(2) *Subcosta* similar in all the species of *Hirmononeura*, but ending somewhat further from the apex in *H. vulcanica* (nearly 3<sup>mm</sup> from tip of wing) and *H. clausa*; ending still further from apex in *Nemestrina* A.

(3) *Radius* (R) is practically the same in all. In *H. vulcanica* it and the subcosta are very thick veins, contrasting with the other longitudinal veins, all of which are slender.

(4) *Radial sector*, or  $R_{2+3}$ . Practically the same in all. In *H. vulcanica* it rises rapidly at the cross-vein, as shown in the figure.

(5) *Radial cell*. In all very long; the cross-nervure, which in many Diptera is very short, having become greatly elongated, and also very oblique, so that it forms more than half of the upper side of the cell. In *Nemestrina* A. and *Hirmononeura* B., as also in *Prohirmononeura*, the cell terminates at the point of origin of the second mediocubital cross-nervure; but in *H. melanderi* it falls a little short of this, and in *H. vulcanica* and *clausa* the distance is considerable. This is shown in the accompanying figures, where the little fork on the right side of the diagram is the end of the radial cell.

(6) *Third radio-medial cross-nervure*. This nervure is absent or not preserved in *Prohirmononeura*. In *H. melanderi* it is very long, and looks like a branch of the radial sector. In the others it is oblique but much shorter, as is shown in the figures (the nervure connecting  $R_3$  with M).

(7) *Media*. In *Prohirmononeura* it simply forks; in *Nemestrina* A. it forks, but the branches are bulged outwards at the base; in *Hirmononeura* B. the upper branch has been deflected basally by the cross-nervure, so that there is a small false cross-nervure at the bifurcation; in the other species the false cross-nervure is large, as the figures show. In *H. clausa* the branches of the media meet again, enclosing a cell.

(8) *Cubitus*. The branching differs in its relation to the first cross-vein, as the figures clearly indicate, a verbal description being unnecessary. It is remarkable that in this, as well as in some features of the media, the recent species, especially *Hirmononeura* B. and *Nemestrina* A., are nearer to the *Prohirmononeura* condition than are the Florissant fossils. The apical cell between the branches of the cubitus is open in all except *H. clausa*.

(9) *Cubital cell* is just closed in *H. clausa*; in the others, narrowly open. According to my interpretation, the vein bounding it apically is a cross-nervure, and not a branch of the cubitus. If this is correct, the vein which Comstock and Needham call  $Cu_2$  in *Leptis*, *Dixa*, etc., is apparently this same cross-nervure, and their  $M_3$  and  $Cu_1$  are  $Cu_1$  and  $Cu_2$ .