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Descriptions of Tertiary Insects. Part VI.

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W. F. Stephen

[FROM THE AMERICAN JOURNAL OF SCIENCE, VOL. XXVII, May 1909.]

DESCRIPTIONS OF TERTIARY INSECTS.

Part VI.

By T. D. A. COCKERELL.

Faunal Papers

ART. XXXII.—*Descriptions of Tertiary Insects*, VI; by
T. D. A. COCKERELL.

A Peculiar Neuropteroid Insect from Colorado.

Eomerope gen. nov. (Meropidæ.)

RATHER stout-bodied, with the end of the abdomen formed somewhat as in *Bittacus*, or nearer, perhaps, to the type of certain Trichoptera; legs with many very strong spines; wings shaped much as in *Merope*, but more elongate, and at the same time with the costal region more strongly arched, and including (between the costa and subcosta) four longitudinal series of cells.

Eomerope tortriciformis sp. n.

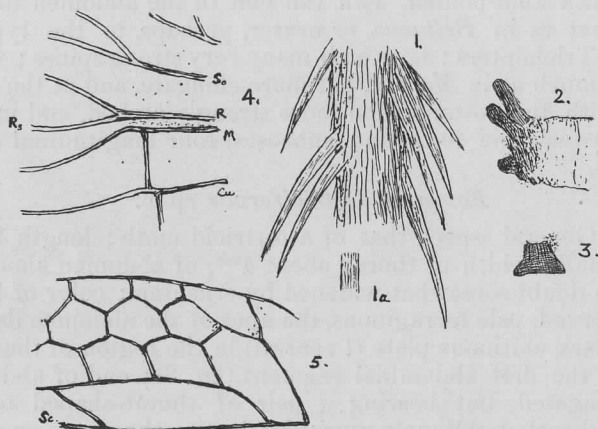
♂. General aspect that of a tortricid moth; length 13^{mm}; head small; width of thorax about 4^{mm}, of abdomen about 3½, both no doubt somewhat widened by crushing; color of body, as preserved, pale ferruginous, the apex of the abdomen darker, and a dark chitinous plate (? ventral) in the region of the basal half of the first abdominal segment (fig. 3); end of abdomen not elongated, but bearing a pair of thumb-shaped obtuse harpes, directed obliquely upwards (fig. 2); the uncus or corresponding structure short and apparently obtuse, without an upturned point; legs with short femora (hind femur about 3^{mm}), but rather long and slender tibiæ and tarsi; (hind tibia about 5^{mm}), the tibiæ (at least) with delicate appressed hair, and numerous very large spines (fig. 1) which are finely striated longitudinally (fig. 1a). The structure of the tarsi, the antennæ, mouth-parts, etc., cannot be seen.

Wings as preserved pale reddish, nearly the color of the shale, faintly striated by the slightly darker veins but without spots or bands; anterior wing 15½^{mm} long, and about 4 broad (the exact breadth difficult to determine), with the basal part of the costa strongly arched, but the apical two-thirds nearly straight (the costal outline much as in *Apochrysa*); apex rounded. Hind wings about 13^{mm} long and 3 broad, more slender than the anterior.

Venation of anterior wings.—Subcosta remote from the costal margin, leaving a large space in which there are for a considerable distance four longitudinal rows of cells. The first upward branch bounds basally two large cells only, but the second branch curves forward and runs parallel with the main stem of the subcosta, and between it and the costal margin are three rows of cells, the second and third of the middle row being hexagonal (this is shown, better than it can be described, in fig. 5); toward the apex of the wing the symmetry is some-

what lost and the cells become reduced, as shown in fig. 7. The cells of the second row from costa, after the third, become longer and lose their hexagonal form, having the lower side straight; after the eighth cell the middle row is lost, there being two large cells in place of three, but there is a

FIGS. 1—5.



Eomerope tortriciformis Ckll.

FIG. 1. Part of anterior tibia, showing the fine hairs and large spines.
1a. part of spine magnified, showing the finely striated surface.

FIG. 2. Apex of abdomen.

FIG. 3. Chitinous plate in region of first abdominal segment.

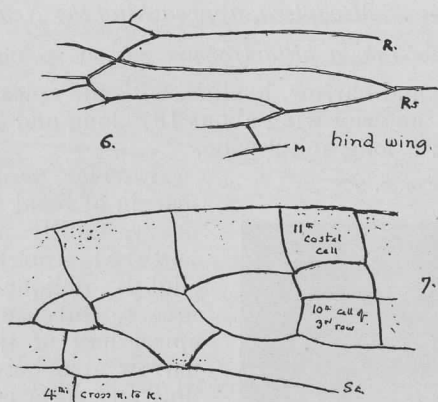
FIG. 4. Venation of anterior wing, showing relationship of radius, media, etc.

FIG. 5. Venation of costal region of anterior wing near base.

small middle cell immediately after, as shown in fig. 7. The area between the subcosta and its upper branch (they ultimately unite again as shown in fig. 7) is divided into three very long cells, the cross-veins being opposite the fourth of the second series of cells (shown in fig. 5) and the basal part of the seventh of the same series. From the subcosta to the radius are four cross-veins, placed at wide intervals, the fourth being shown in fig. 7 (*Panorpa* has usually two such cross-veins). The radius and media at first run side by side, so that upon superficial examination they look like one very stout vein; at the point where the radius branches the media bends downwards, as shown in fig. 4 (this differs from *Panorpa* in the earlier branching of the radius). The radial sector forks, and the lower branch forks again; the upper branch of the latter fork again branches, and its upper branch is connected by a cross-vein with the upper main branch of the sector, so that there is enclosed an elongated cell, very acute basally, obliquely

truncate apically, and with its lower side divided into three sections. The media and cubitus appear to be formed much as in *Panorpa*, and are connected by cross-veins, as shown in fig. 4. Their distal parts are obscured. There are two very strong but short curved anal veins, running downwards to the lower margin (much as in *Merope*, but shorter and more curved).

FIGS. 6—7.



Eomerope tortriciformis Ckll.

FIG. 6. Venation of hind wing, showing branches of radia. sector.
FIG. 7. Venation of costal region of anterior wing toward apex.

Venation of hind wings.—This cannot be wholly made out, but fig. 6 shows the discal region. The branches of the radial sector enclose a long cell much as in the anterior wing.

Hab.—Miocene shales of Florissant, 1907; doubtless from Station 14, but the specimen is not marked with any number or collector's initial. Holotype in Yale University Museum.

This is one of the most puzzling fossil insects I have had occasion to describe, but I believe it is correctly assigned to the Mecaptera. The form of the wing, with the strongly convex costa and numerous costal cells, is very different from that of *Panorpa*, *Bittacus*, etc., but the isolated and peculiar *Merope*, of the eastern United States, shows an approach to this condition, the costal area being broad, and some of the cells divided into two. On the other hand, the apical structures of the abdomen in *Eomerope* do not resemble those of *Merope*, but are even more simple than *Bittacus*, showing resemblance to the doubtless more primitive condition found in the Trichoptera. There is no particular resemblance to the Mesozoic Orthophlebidæ.

Handlirsch divides the modern Mecaptera or Panorpatæ into four families: Bittacusidæ, Panorpidæ, Meropidæ, Boreidæ.

If this is admitted, apparently Meropidæ may be divided into Meropinæ, for *Merope*, and Eomeropinæ, n. subf., for *Eomerope*, the latter being separated on the structure of the abdomen and the venation of the anterior wings. It may be supposed that these insects represent an American type, once prevalent, but now reduced to a single genus and species, *Merope tuber*, Newman.

A New Type of Mecaptera, approaching the Nemopteridæ.

Eobanksia bittaciformis gen. et sp. nov.

Wings long and narrow, hyaline, with the apical half of the costa fuscous; anterior wing about 16^{mm} long and 3 wide; hind wing about 12^{mm} long and 2 wide.

FIG. 8.

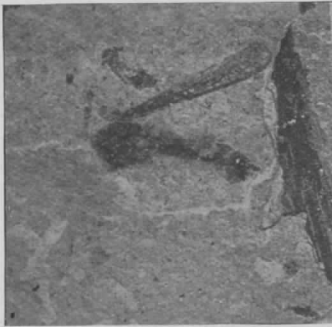


FIG. 8. *Eobanksia bittaciformis*
Ckl.

Anterior wing.—Costal margin of basal half of wing heavy, faintly arched, with several straight or very slightly oblique cross-nervures to subcosta. On the apical half of the wing the narrow area between the radius and costa is wholly fuscous, and no cells are visible. Subcosta straight, running parallel with and close to the radius, its exact termination not visible on account of the darkening. Radius *perfectly straight*, even toward the base of the wing only half a millimeter from costal margin,

and terminating on costa a short distance before the obtuse apex of wing. Radial sector leaving radius about 6^{mm} from base of wing, and branching after a course of about 3^{mm}, running practically as in *Bittacus*; the lower branch simple; the upper running near the radius, and forked after a course of 4^{mm}; in another specimen the lower branch of this fork is again forked. Media appressed to radius at base, and after 3^{mm} leaving it at a very acute angle, and having a straight unbranched course, practically parallel with the stem and lower branch of the radial sector. Cubitus small and weak, running close to lower margin, and bending abruptly downwards to end upon it, after about 4^{mm}. Cross-nervures irregular and variable, but more numerous than the *Bittacus*, especially in the basal half of the wing. No anal visible, nor indeed is there room for one.

Posterior wing.—Narrow, with two strong parallel closely adjacent straight veins running its entire length, about two-

fifths of the wing above, and three-fifths below them; media represented by a straight rather weak vein in the lower field; cross-nervures oblique, their more distal ends on the margin.

The type consists of a pair of wings; another specimen (Station 13 B, *Miss Gertrude Darling*) shows the thorax and

FIG. 9.

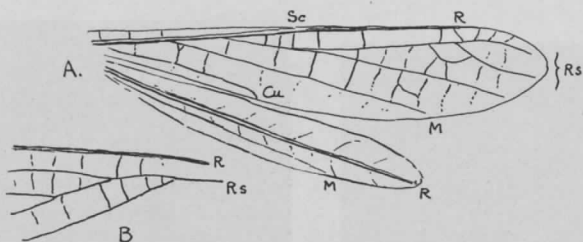


FIG. 9. *Eobanksia bittaciformis* Ckll.

A. Diagram of wing of type.

B. Branching of radial sector in another specimen.

abdomen; the head is missing. The thorax is about 6^{mm} long, the abdomen about 13, the latter curved, and apparently formed exactly as in *Bittacus*, although no details can be seen. When the wings are folded backwards, the costa is downward.

Hab.—Miocene shales of Florissant, Colorado. A cotype in Yale Museum. This remarkable insect seems to form a new family (*Eobanksiidae*) of Mecoptera. The anterior wing is very like that of the Panorpids in many respects; the hind wing closely resembles that of the Nemopteridæ, though not so elongated, and without an apical expansion. (Some Nemopteridæ have no expansion.) Mr. N. Banks, to whom I sent a sketch of the venation, agrees that there is a distinct approximation to *Nemoptera*. Formerly it used to be maintained that the Panorpids (Mecoptera) and Nemopterids were allied; the insect now described appears to lend support to this opinion. The genus is dedicated to Mr. N. Banks, in recognition of his labors on the Neuroptera.

Trichoptera from Florissant.

Phenacopsyche vexans gen. et sp. nov.

Anterior wing.—Length about 19^{mm} (16½ visible, the base hidden), outer margin about 10^{mm}, lower margin about 14. Costa with basal half straight, apical slightly arched; apex obtuse, outer margin regularly convex. Wing brownish, from a rather dense scaling or pubescence, the apical part of the costal region and the broad (3^{mm}) outer margin darker than the rest (possibly less denuded); veins dark brown.

The wing has an extraordinarily Lepidopterous appearance, being very much as in the broader-winged Noctuids, and even more like some of the Hesperiids, especially in the distinct anal angle. Regarding it as Lepidopterous, the visible portion of the venation nearly agrees with that of *Adoneta*, except for the

FIG. 10.



FIG. 11.

FIGS. 10 and 11. *Phedacopsyche vexans* Ckll.

insuperable difficulty of two extra veins between the supposed media and cubitus. Treated as Trichopterous, this difficulty disappears, the supposed median cell being the discoidal, in the forks of the radial sector.

The generic characters ascertained are as follows :—

Discoidal cell present, elongate triangular; no median cell; radius (R_1) joined to first branch of radial sector (R_3) by a cross-nervure, about 1^{mm} (on R_3) beyond discoidal cell: at this cross-nervure (which is regularly present in *Panorpa*, and also occurs in various Trichoptera, as *Rhyacophila*, *Odontocerum*, and *Namamyia*) the radius is bent a little upwards, as shown in the figure. The five branches of the radius, and four of the media, are all present, and consequently the apical cellules 1 to 7, none being either absent or stalked. R_2 and R_3 leave the discoidal cell close together near its apex, and R_5 leaves its lower corner, being in a line with its lower side. M_3 and M_4 are stronger than M_1 and M_2 , and appear to form the principal branches of the media, M_1 and M_2 leaving from an evanescent vein passing up from the media to the radius. Mr. N. Banks, to whom I sent a sketch of the venation, remarks on the apparent absence of the anterior main branch of the media, which should go to M_1 and M_2 . I have carefully examined the specimen, and although the main stem of the media is strong and dark, I find no sign of this branch. It seems as if it had migrated forwards, to form the vein leaving M_3 for the bases of M_1 and M_2 , the latter being connected at the base also (by a cross-vein) with the radial sector.

Apparently the genus must be referred to the Odontoceridæ, but Mr. Banks intimates that this is hardly a natural family, but "a sort of waste-basket" for things hardly fitting into Seri-

FIG. 12.

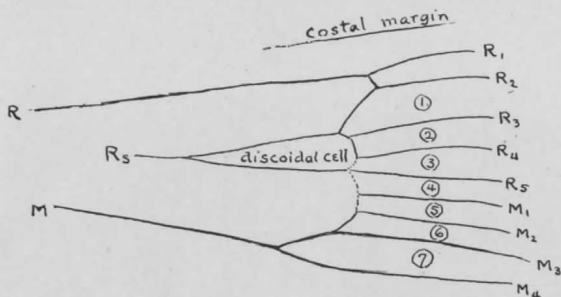


FIG. 12. *Phenacopsyche vexans* Ckll. Diagram of venation.

costomatidæ, and without the necessary characters of Leptoce-
ridæ, Rhyacophilidæ, or Hydropsychidæ.

Hab.—Miocene shales of Florissant, 1908 (Station 13 B, *Geo. N. Rohwer*).

Hydropsyche scudder sp. nov.

Larva in general similar to that of *Hydropsyche* sp., figured in Bull. 47, New York State Museum (1901), plate 15, f. 3, but much longer (length about 31^{mm}), though not broader (width of thorax about 3^{mm}), and with the thoracic plates much more nearly equal in size, being, in lateral view, about as deep as long. Head and thoracic plates strongly chitinized, of the usual rather dark reddish brown color; head 3^{mm} long and 2 deep, apparently quite normal; abdomen visible only as a faintly darker shade, of about the same width as the thorax, having slight indications of dark transverse and longitudinal markings. On one specimen indications of the branched gills, yellowish in color, can be seen on the first three segments. The caudal end is slender and produced, the caudal legs provided with the usual spreading bunches of hair. No indication of any case.

There are two good specimens before me, one showing the dorsal, the other the lateral aspect. Many others have been found; those in which the abdomen cannot be clearly seen are curiously similar to Scudder's *Planocephalus aselloides*.

Hab.—Miocene shales of Florissant.

Scudder is no doubt correct in assuming that the Hydropsychidæ of Lake Florissant did not breed in the lake, but in the small streams running into it. During the volcanic eruptions these streams may have been so heated that the larvæ were killed and then washed into the lake.

University of Colorado, Dec. 2, 1908.

