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NEW LIGHT ON THE GIANT FOSSIL MAY-FLIES OF MONGOLIA[1]

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In May, 1925, in the course of the Third Asiatic Expedition of The American Museum of Natural History, Dr. R. W. Chaney collected additional materials in the original Ondai Sair locality, representing species already recorded from the same locality and horizon.[2]

Although there are apparently no new species, specimens of the wings of *Ephemeropsis* afford the means of revising our conception of that genus, and of placing it more accurately in the system. The best specimen, with reverse, is on a large slab close to a specimen of *Estheria middendorffi* Jones. The end of the wing is missing, but the whole length is preserved in another specimen, on a smaller piece of rock, and the wing length is seen to be 35 mm. The apex is broadly rounded, and the breadth about the middle is about 15 mm.

The two specimens referred to clearly represent the same thing, but differ in certain respects from the wing previously recorded. The first thing that struck me on examining them was the strong resemblance to *Palingenia*. This is singular, because the nymph of *Palingenia* is known and is not at all like the *Ephemeropsis* nymphs. Furthermore, upon comparing Tillyard's figure[3] of the Permian *Protereisma*, it at once becomes evident that the media of my former figure (*loc. cit.*, p. 138) is the anterior part of the cubitus and that the branched vein above it is the media. With this interpretation, the resemblance to *Protereisma* is more striking, and I think we must consider these insects typical of a family, Ephemeropsidæ, not a subfamily of Siphlonuridæ as formerly given.

The broad fork of the first cubitus in both specimens now before me emits a vein from the middle of the fork, instead of from the upper branch as shown in my former figure. This (and other smaller differences)

[1] Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 70.
[2] 1924, Bull. Amer. Mus. Nat. Hist., LI, Art. VI.
[3] 1923, Linnæan Soc. Journal, Zoology, XXXV, p. 145.

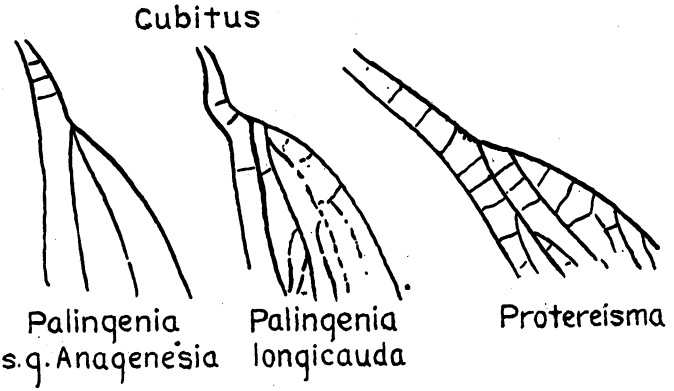

Fig. 1. Branching of first cubitus in *Protereisma* and *Palingenia*.

may not indicate a distinct species, but it is noteworthy that it is precisely in this way that the living *Palingenia*, subgenus *Anagenesia* of Eaton, as represented by its type species *P. lata* Walker (from Silhet) and also by *P. ampla* Eaton (Sarawak), differs from the type of *Palingenia*, *P. longicauda* Olivier. However, other species of *Anagenesia*, *P. javanica* Eaton, *P. tenera* Eaton, and *P. papuana* Eaton, do not have the vein from the fork, but in this matter resemble *P. longicauda*. *Protereisma*, as figured by Tillyard, also has the vein from the upper branch. As it is impossible definitely to connect either of the two wing types with particular nymphs, but on the whole it is perhaps most probable that they do not represent more than one species, I shall designate the formerly published figures (*loc. cit.*, p.138, figs. 3 and 4) as *Ephemeropsis trisetalis* **berkeyi**, and the wings now described and figured as *E. trisetalis* **chaneyi.**

Ephemeropsis trisetalis chaneyi, new variety

(1) Subcosta very strong, greatly prolonged, reaching the costa (as shown by the second specimen) very near the wing-tip: a character of *Protereisma*, not at all of *Palingenia*. This character is also seen in various living genera, as *Ephemera* and *Hexagonia*.

(2) First radius very strong, running below subcosta to near tip of wing, as in *Palingenia* and *Protereisma*.

(3) Radial sector with its upper portion (Tillyard's R 2a in *Protereisma*) comparatively weak, contiguous with R 1 at base, branching twice at very acute angles, the first branch just above the fork of cubitus, the lower division branching again about 7.5 mm. beyond. This differs from *Protereisma* in that it certainly does not come off the lowest branch of sector as shown in Tillyard's figure. The stem of R 3 in the *Ephemeropsis* specimen is pressed against the thick stem of R 1, and

the faint stem of R 2a disappears between them; it is probably really confluent with R 4+5 at extreme base, as in *Palingenia*. The forking is much as in *Palingenia longicauda*.

(4) The lowest radial branch (R 4+5) is very stout and has a practically straight course for about 20 mm., when it forks at a rather wide angle, essentially as in both *Protereisma* and *Palingenia longicauda* (though the angle is wider), but in the subgenus or genus *Anagenesia* the fork is much nearer the base of the wing. In the fork thus formed are two rows of cells, the upper row deeper than the lower.

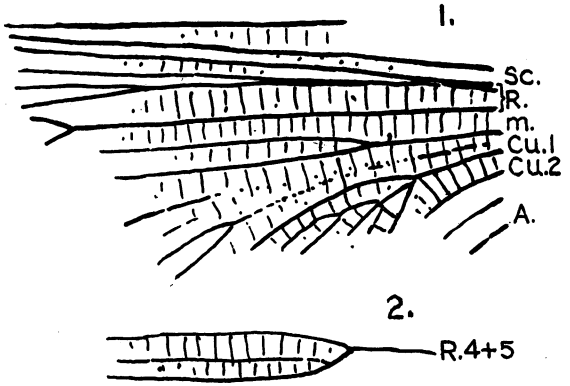

Fig. 2. *Ephemeropsis trisetalis* var. *chaneyi*.
1. Part of wing of type.
2. Detail of forking of R 4+5 in second specimen.

(5) The media is weaker and less perfectly preserved, but it forks almost at base of wing, and the upper part forks above cubital fork, about 6.5 mm. from base of wing. The lower division forks a considerable distance beyond; this is more like *Palingenia* than *Protereisma*, but not very much like either.

(6) The first cubitus is not curved at base (as it is in *Palingenia longicauda*, but not in *Anagenesia*), and runs a slightly arched course for about 8 mm. It then offers a very wide fork, the upper branch curved (arching), the lower straight. Evenly bisecting the fork is a vein, placed as in *Palingenia lata*, but soon emitting a vein from each side, the upper one seen to fork after a short distance.

(7) The second cubitus runs evenly below the first, taking a curved course, and is connected with the first cubitus by many cross-veins, forming high, narrow cells.

(8) The anals are not sufficiently preserved to be described.

(9) The cross-veins throughout are many and closely spaced, forming high, narrow cells, with very many small cells in the distal part of the wing. This is more like *Polymitarcys* or *Hexagenia*.

(10) The costal margin is more remote from the subcosta basally than *Protereisam* or *Palingenia*.

(11) There is a tendency for the distal veins to approach in pairs, as in *Palingenia*; at least this is marked in the case of R 3 and R 4a, which run very close together apically instead of remaining parallel as in *Protereisma*.

On all counts, then, the wing stands in the vicinity of *Palingenia*, with very strong resemblances to *Protereisma*. Yet the nymph is of a siphlonurid type and not at all like that of *Palingenia*.[1] That the nymphs and wings belong to quite different animals, I cannot believe. An *Ephemeropsis* nymph can be seen on the same piece of rock as one of the wings. From the appearance of one of the wings it seems certain that it was brown or dusky.

[1]For figure of *Palingenia* nymph, see E. Rousseau, 1921, Les Larves et Nymphes Aquatiques des Insectes d'Europe, p. 187.