

A NEW SPECIES OF MAYFLY, *PALINGENIA* (*SENSU LATO*), FROM MESOPOTAMIA.

BY KENNETH J. MORTON, F.E.S.

(Plate II.)

ALTHOUGH this species of *Ephemeroptera*, so remarkable in its appearance, and on account of the vast numbers in which it emerges during a very short period from the waters of the Tigris and (it is assumed) the Euphrates, may have been noticed by other officers serving in Mesopotamia, yet as far as I know there have been no specimens sent home excepting by Capt. P. A. Buxton and Capt. W. Edgar Evans. That it was so noticed may be gathered from "Notes on Some Asiatic Species of *Palingenia*," by F. H. Gravely ('Records of the Indian Museum,' vol. xviii, pt. 3, pp. 139-143, pls. xviii-xx, April, 1920), who, under the heading "*Palingenia* (s. str.)? *longicauda*, Oliv., *Palingenia* sp. (? *robusta*), Needham, from Seistan," says: "The species probably occurs also in Mesopotamia, as Major Connor writes that he saw millions of the large mayflies on the Euphrates at the beginning of April. They were being eaten up by the ordinary Caspian river tortoise as they lay in heaps in eddies or slack waters. They swarm in the river even as far down as Basra." As the Mesopotamian species is apparently new I describe it as follows:

Palingenia mesopotamica, n. sp.

♂ (dried). Head above dull black, sordid white in front and also posteriorly. Pronotum transverse broader posteriorly, anterior margin sinuous, produced in the middle; posterior margin nearly straight; dull blackish sordid white in the middle and at the sides, sternum black. Mesonotum dull deep black, sutures white, a fine white median line, sternum black. Metanotum in its anterior part black with a white median spot. Legs white, anterior ivory white, slightly tinged with fuscous on the coxæ and trochanters. Wings sub-opaque, ochraceous, slightly paler towards the base; they shrivel at the tip when dried. Abdomen robust, of nearly equal breadth to the thorax only slightly narrower in the apical segments, mainly brownish above; posterior margin of segments narrowly whitish; forceps limbs and penis lobes ivory white, setæ ribbon-like,

about $1\frac{1}{2}$ times as long as the abdomen, the joints indistinct. Abdomen beneath whitish or yellowish with a dark line on most of the segments at the lateral borders.

Examples of both sexes in fluid do not differ much from the dried specimens. Dark markings on head more clearly defined (see Fig. 4); a small projection on each side at the eyes and two projecting lobes in front in the middle. The fore legs have fine black lines at the base of the coxæ, trochanters, tibiæ and tarsi, the joints of the tarsi also faintly annulated; these markings less evident on the other legs. Wings almost white and translucent. The abdomen is rather paler than in the dried specimens and the segments show on the middle above two pairs of faint paler divergent lines sometimes macular. Setæ pubescent with uniform hair. Wings apparently unfringed. There are two elongate tubercles at the apex of the fore tibiæ in the ♀.

Length of body (from front of head to apex of abdomen, ex. forceps in ♂), 20-21 mm.

Length of fore wing, 20-22 mm.

Length of hind wing, 8-8½ mm.

Two ♂♂ (dried), 7 ♂♂, 7 ♀♀ (in fluid), Buxton; 3 ♂♂ (dried), Evans: All from Amara, April 4th, 1918.

Ulmer, "Übersicht über die Gattungen der Ephemeropteren," 'Stettiner Entom. Zeit.', lxxxi, 1920, divides the genus *Palingenia*, Burmeister, restricted Eaton, into three genera: *Palingenia*, *Anagenesia* (Eaton's sub-genus), and *Plethogenesisia*, Ulmer. The present species does not agree with any of these, and if Ulmer's genera be adopted, a new genus will fall to be erected for its reception. The following characters in *P. mesopotamica* may be noted:

(1) Forceps-limbs 7-jointed, a long basal one, the others short, as in *Palingenia* restricted.

(2) Media of fore wing forked before middle of wing.

Lower branch of cubitus and intermediate cubital vein may arise from anal vein 1 (this character appears to be unstable and these veins may sometimes arise as in *Palingenia* from upper branch of cubitus).

In anal area 1, usually only one long intermediate vein.

Female setæ half as long as the abdomen (there is a minute intermediate seta in both sexes).

Fore tarsus of ♂ only about as long as the femur (tarsus 2 mm., femur about $2\frac{1}{2}$ mm.).

These characters are in common with *Anagenesia* and *Plethogenesisia*.

(3) Media of fore wing forked later than sector.

Sub-costa and radius very close but distinctly separated at the apex (not visible in fig. 1, Plate II, but easily seen when the wing is floated out in scalding water).

Head with forked process in front.

Fore legs of ♂ longer and stronger than hind legs; femur nearly $2\frac{1}{2}$ mm., tibia $2\frac{1}{2}$ mm. fully.

Intermediate tarsus about as long as the tibia.

Hinder tarsi 5-jointed, 2-clawed, claws unequal.

All as in *Plethogenesis*.

Ulmer refers to a difference in the tenth sternite in *Anagenesia* compared with that in *Plethogenesis*, but I am unable to follow his meaning in this connection.

With regard to the habits of this insect, Evans notes: "Appeared on the Tigris in several spots in and about Amara on April 4th, 1918. They have not been noticed since. They did not fly in the air, but behaved like hydroplanes, circling and and skimming over the surface of the water, the long "tails" dragging on the surface, the body slightly raised and the wings beating rapidly." Buxton writes: "Amara, April 5th, 1918. Large mayflies floating down stream in huge shoals for some days past; never seem to fly, though ♂ ♂ (?) observed chasing ♀ ♀ (?) along the surface of the water, with much beating of inadequate wings." "After that I never saw them fly, and they got more and more battered by the ripple on the surface of the water. Finished altogether in about a week from their first appearance."

Eaton ("Rev. Mon. of Recent Ephemera," 'Trans. Linn. Soc. Lond.,' 2nd ser., vol. iii, p. 10) says: "The male of *Palinogenia* has very short fore legs; and he is mated, not in mid-air, but upon the river amidst crowds of rivals, who pile themselves up upon him and his surroundings until he is overwhelmed by a large struggling mass of them floating down the stream like a heap of foam, whose resting place (in New Guinea at least) is generally found in the mouth of a big fish." Observations on the Mesopotamian species are not as complete as could be wished, but as far as they go, considering the bulky form of the insect, they point to the improbability of its being capable of aerial movements such as are recorded of *P. papuana*.

A reference to the appearance of these countless throngs of *Palinogenia* and to their evanescent character in other countries may not be out of place. Eaton (*op. cit.*, p. 28) gives a summary of a passage from Signor d'Albertis' travels regarding the swarming of *P. papuana* on Fly River, New Guinea: "On July 2nd, 1876, a few hours before sunset, we witnessed a strange and magnificent sight produced by an abundance of a species of mayfly actively pursued by the following birds: *Calornis metallica*, *Artamus cucopygialis*, a *Graculus*, a *Eurystomus*, and the commonest white-headed osprey, *Haliastur girrenera*. Simultaneously the insects were being preyed upon by thousands of fishes, who rushed up to seize them whenever they touched the water with their delicate wings. But so profuse was the abun-

dance of the flies that the ravages of all their destroyers caused no appreciable diminution in their numbers. Mile after mile, from bank to bank, the river seemed covered with them, when all at once, as if by signal, the whole of them rose up confusedly, flying aloft in a thousand different directions, producing an effect in the air like that of a heavy fall of snow; then they descended again and the snow seemed to cover the river with a white layer. The males very largely outnumbered the females." Eaton also mentions (*op. cit.*, p. 24) that according to Mr. Snellen, of Rotterdam, Swammerdam's statement that *P. longicauda* appears in vast multitudes during one or two evenings only every year "on or about the Feast of St. John" is generally correct, but the date of the swarm is liable to be earlier in warm seasons, sometimes as early as June 10th. Reference may also be made to the great swarms of *Oligoneuria rhenana* which appear on the Rhine, and whose duration is limited to a day or two (Müller, 'E. M. M.,' vol. i, p. 262, and vol. ii, p. 182). *Polymitarcys virgo*, Oliv., another mayfly, also appears in great numbers on some of the larger European rivers, giving rise to the local name "*la manne*," and the accumulations of the dead bodies of this species have in some parts of Germany received the name of "Uferaaas."

Mr. Martin E. Mosely, ever ready to assist, kindly made for me a fine series of slides of the wings and other details, and provided the photograph of the whole insect. For the photograph of the wings I am indebted to Mr. R. M. Adam, of the Royal Botanic Gardens here.

EXPLANATION OF PLATE II.

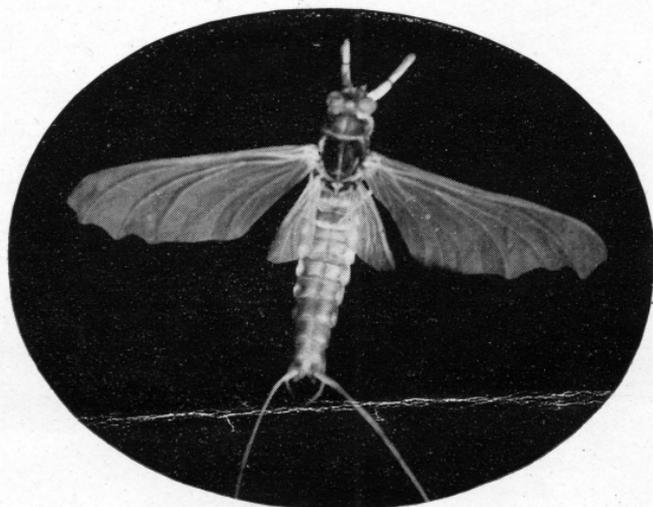
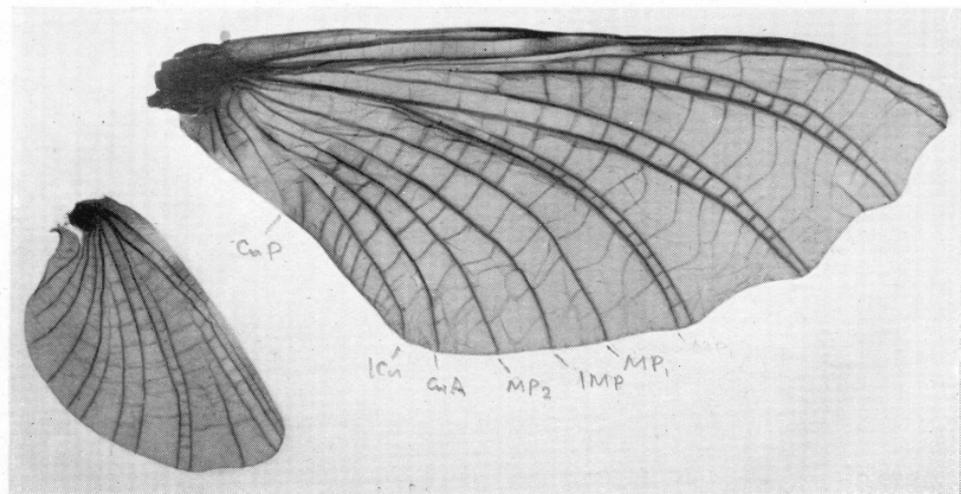
1. Wings of ♂ (\times about 4).
2. Whole insect, ♂ (\times about $1\frac{1}{2}$), setæ incomplete.
3. Forceps of ♂ from beneath; (a) apex of penis lobe from above.
4. Head of ♂ from above; two basal joints of antennæ only shown; position of anterior ocellus uncertain.

Fig. 1, from wings mounted in balsam; the others from examples in fluid.

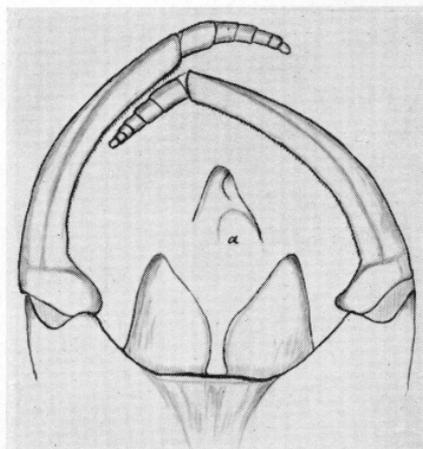
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Edinburgh;

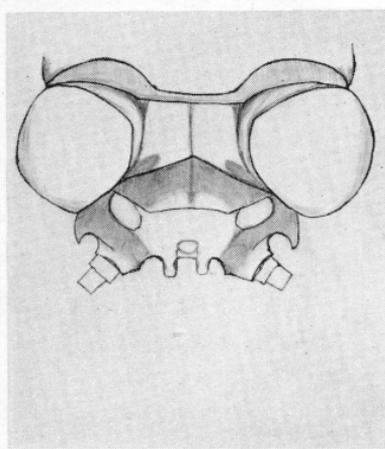
June 11th, 1920.



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Palingenia mesopotamica.