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IX. *New species of Ephemeridæ from the Tenasserim Valley.* By the Rev. ALFRED E. EATON, M.A., F.E.S.

[Read March 9th, 1892.]

THE rule that description and naming of new species of May-flies, represented incompletely by no matter how many specimens of one grade or sex only, ought never to be practised if the species lack definite character with regard to that grade or sex, does not apply to species of peculiar mark such as are distinguished in the following pages. Considerable interest attaches to them in respect of the geographical distribution of genera, and some of the flies are particularly ornamental. They were collected in the Tenasserim Valley by Mr. Doherty, and sent by him to Mr. R. McLachlan, F.R.S. The specimens, 21 in number, represent eight named genera, each (with one exception) by single species. A key to the genera and larger divisions of recent *Ephemeridæ* is given in Trans. Linn. Soc. Lond., 2nd ser., Zool., vol. 3, part 5, p. 309, &c., preceded by geographical notes.

1. *Ephemera pulcherrima*, sp. nov.

Subimago (dried), ♀.—A yellowish species with linear longitudinal abdominal markings, besides a round spot just above the pleura on each side of the 2nd segment; also with an angulated spot on the hind coxa; and with three round or oblong spots in the area immediately posterior to the submarginal area of the fore wing. Hind wing spotless. Wings very light yellow ochraceous, subopaque: fore wing sparsely marked with small violet-black spots, situated—one each at the bullæ of the subcosta and radius, one in line with these on the sector, a small one occupying the axil of the fork of the præbrachial nervure, and three others, one in the middle of each of the last three cross veinlets immediately posterior to the radius; hind wing spotless, unicolorous. Neuration in both wings concolorous with the membrane (but opaque), excepting a few cross veinlets in the submarginal area of the hind

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wing that are greyish towards the subcosta, and some in the fore wing, *vis.*, the cross veinlets anterior to the sector, many of those anterior to the pabrachial in the basal half of the wing, and a few of those nearest to the base in the areas intervening between that nervure and the 1st axillar nervure; the great cross vein also is black between the subcosta and the radius. Body and legs yellowish ochre, with black markings; those of the head and notum are of a pattern common in the genus, comprising the edge of the occiput on each side behind the eyes, and two longitudinal stripes extending from the pronotum (where they are parallel with each other) to the peak of the scutellum, angulated on the mesonotum and confluent just before their termination with a rounded pitch-brown spot on the succeeding part of the notum on each side. On each side of the thorax is a small spot in front of the roots of the costa, and a minute spot just above the coxa at the posterior angle of the metapleuron. The basal and the posterior margins of the hind coxa, and the anterior tibia, narrowly, at both extremities, are blackish. Dorsal abdominal markings—two sub-continuous and subparallel series of strongly marked linear stripes; rather near each other, extend from the 3rd to the 9th segment down the middle of the back, and are slightly coarctate at the bases of the 3rd to the 8th segments; between these in each segment is a pair of divergent streaks from the base of the segment that are associated with the dorsal vessel, and are less distinctly defined than the linear stripes: in some of the segments the streaks are considerably abbreviated; in the 2nd segment (which is marked with a round spot on each side just above the pleura) the stripes are represented by single dots; at the joinings of the 1st to the 8th segments the stripes are crossed by single fine black lines that do not extend to the pleura. At the pleura, segments 2—9 have each a small triangular spot at the base, and segments 4—7 each have a fine curved longitudinal line from the margin near the posterior angle, which is reduced to a dot in segments 3 and 2. Venter bilineate longitudinally; the lines subparallel, discontinuous, and some of them at their anterior extremities slightly inflected. Setæ fuscous, with opaque joinings, and some of them here and there blackish. Length of body about 12, wing about 18 mm.

2. *Potamanthus formosus*, sp. nov.

Imago (dried).—A species of elegant appearance, with transparent wings of a light flavescent tint: the fore wing strongly blotched with light reddish pitch-brown in the marginal area, and sparsely freckled faintly in the disk with light greyish or reddish

grey. Upper parts of the anterior femur dull reddish purple-brown: a narrow stripe (of a like colour in the abdomen, but more of a piceous tint in the thorax, where it is narrowest) extends from the head along each side of the body to the 9th abdominal segment.

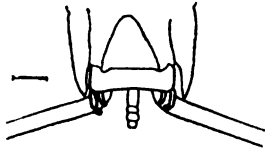
♂. Whitish ochre, more flavescent about the thorax, with reddish brown or reddish purple-brown markings, comprising—a fine median longitudinal line through the pronotum, continued along the median suture of the mesonotum; the orbits of the ocelli, and the greater part of the basal joints of the antennæ; and a longitudinal stripe of moderate width on each side of the body from the pronotum to the 9th abdominal segment, which, commencing opposite the back of the eyes, is arched on the pronotum, and prolonged posteriorly below the wings. Setæ flavescent for some distance from the roots, and then very light ochreous, with the joinings narrowly very light reddish purple; at the extreme tip, a few of the joints (2 or 8) are minutely pilose. Legs light yellowish amber-colour, except parts of the fore leg, *viz.*, the upper parts of the fore femur reddish purple-brown throughout; a small spot of the same colour underneath, just beyond the middle, and another rather larger underneath at the tip, produce annulations: tibia reddish purple-brown at the extreme base, but dark purple or violet-carmine at the tip; 1st tarsal joint, and the tips of the 2nd, 3rd, and 4th joints also of this colour. In the fore wing the cross-veinlets of the marginal area are rather broadly and conspicuously bordered with light reddish pitch-brown; the bordering sometimes is partly dark-edged, and the colouring, entirely permeating the costa and the terminal portion of the subcosta, spreads narrowly along both these nervures between the spots or blotches; it also invades the extreme apex of the submarginal area, and insinuates itself into the next area thereabouts in near proximity to the radius, and the fore parts of the last two or three cross-veinlets therein. The faintly coloured freckles in the disk of the fore wing are disposed approximately in two linear series—one of three freckles, posterior to the anal nervure, near the bends or primary forks of its branches; the other of four freckles, nearly parallel with the terminal margin, one of which is at the bend or inner extremity of the intercalary nervure contained within the fork of the præbrachial; there is also another freckle, out of rank, at the bend or inner extremity of the first long intercalary nervure after the pobrachial that represents a postical nervure. Hind wing spotless. Neuration for the most part light yellow amber-colour; but in the fore wing, the costa from the first cross-veinlet onwards, the greater part of the subcosta towards the

tip, and the radius near its extremity, are rufo-piceous or warm amber-brown, as well as the cross-veinlets adjoining them, and from certain standpoints many of the other cross-veinlets become piceous. Cross-veinlets of the marginal area simple; in both sexes about 24 in number.

♀. Similar to the ♂, but with the cross-veinlets in the disk of the fore wing more generally piceous. Length of body, ♂ and ♀ 7; wing, ♂ 7, ♀ 9; setæ, ♂ 15 and 12—18 and 14, ♀ 11 mm.

3. *Rhoënanthus amabilis*, sp. nov.

Imago (dried), ♂.—Remarkable for the excessive smallness of the forceps, which in both of the specimens are quite rudimentary. Cross-veinlets of the fore wing pitch-brown, with narrow edging of the same colour, which in some parts is triangularly dilated at both ends of the veinlets, in other parts fills up meshes of the reticulation so as to form small spots, and along the terminal margin, where the neuration is closest, produces a cloudy marbled reticulation. Thorax light pitch-brown, approaching intense raw umber, modified on the mesonotum with a lighter tint. Abdomen rather darker than the thorax at the sides and hinder borders of the segments, but with dull whitish ochreous markings along the middle of the dorsum, comprising, in segments 7—9, a rounded median spot at the base, a dot on each side near the base, and two dots on each side before the dark apical border of the segment. Setæ white, with dark purple-madder annulations at the tips of the joints: in the first seven joints from the roots, the dark colouring largely predominates; after that, throughout the greater part of



Rhoënanthus amabilis (Tenasserim Valley).

the seta, the annulations are alternately narrow and broad, one joint being almost entirely white, and the next joint purple-madder in its apical half, and so on; the last three or four joints are pilose, as in *Potamanthus*. Forceps very minute; the limbs 2-jointed, much shorter than their distance apart, not exceeding in length one-third of the width of the basis, and being much smaller than the produced posterior lateral points of the 9th dorsal segment; their colour white, but purple-madder just at the base. Penis-lobes more minute than the forceps, filiform or subulate,

with the tips incurved. Fore leg with the femur and the extreme base of the tibia light pitch-brown; the remainder whitish, with the 1st tarsal joint, and the tips of the other joints, as well as that of the tibia, rather broadly piceous. Hinder legs very light yellow-amber, with an annulation at the extremity of the tibia, the tips of the tarsal joints and the unguis piceous. Wings vitreous, with piceous markings; the longitudinal neuration for the most part whitish, the cross-veinlets in the fore wing and in part of the hind wing piceous; the remaining neuration in the hind wing whitish. In the fore wing the piceous markings (referred to more in detail in the prefatory diagnosis above) tend to be confluent transversely opposite the bulla of the subcosta, and again nearer the base in the middle of the disk; there is also a small blotch at the commencement of the pterostigmatic region: the marginal area contains about 7 cross-veinlets before and 17 beyond the bulla, nearly all simple. In the hind wing, besides some lesser markings posterior to the cubitus, is a blotch or several subconfluent spots on the cross-veinlets of the radial—sectorial regions a little before the apex, a spot at the junction of the sector and cubitus, and a large spot at the head of the intercalary nervure contained within the fork of the præbrachial. Length of wing, 8; setæ, 25 mm.

4. *Choroterpes exiguus*, sp. nov.

Imago (dried), ♂.—Body pitch-brown: venter in at least segments 5—8 paler, and in the 9th segment rusty or light burnt umber-brown. Legs in two specimens light pitch- or bistre-brown; femora banded just beyond the middle broadly, and at the knee narrowly, with a rather darker tint; in another specimen they are banded broadly in the middle and narrowly at the tip with pitch-black. Wings entirely vitreous, with light pitch-brown neuration: fore wing with no cross-veinlets before the bulla in the marginal area, but with 9—12 simple ones in the pterostigmatic region. Setæ, in the two specimens referred to above, sepia-brown; in the other specimen whitish, with the joinings narrowly black. Forceps-limbs suddenly and broadly dilated in the basal half of their basal joints. Penis-lobes narrow, lanceolate, and contiguous. Length of wing, 6—6.5; setæ about 10 mm.

5. *Hagenulus monstratus*, sp. nov.

Subimago (dried), ♂.—Wings light blackish grey (ivory-black), with most of the neuration of the same colour, but with the cross-veinlets of the marginal and next two areas of the fore wing bordered more or less broadly with pitch-black, broadest in the

first half of the marginal area: in the same area, a blot of this colour embraces about four cross-veinlets in the middle of the pterostigmatic region; in the area next below the submarginal area, a spot at the bulla includes two cross-veinlets, and another at the apex about three cross-veinlets.

Imago (dried), ♀.—Body pitch-brown. Femora pitch-brown, with a narrow impure whitish annulation a little beyond the middle: tibiæ and tarsi brownish white, with the knee whitish; the fore tibia just below the knee and again at the tip narrowly and faintly annulated with light brown. Setæ whitish, rather broadly annulated with blackish at the bases of most of the joints. Ventral lobe of the 9th abdominal segment bifid: the 7th ventral segment unprovided with an egg-valve. Wings vitreous; the fore wings with pitch-black markings associated with the cross-veinlets. The most conspicuous of these markings are produced by the very broad bordering of the cross-veinlets in the marginal, submarginal, and the adjoining areas, which in places forms quadrangular or subquadrate spots; some of these in the basal halves of the areas in question, also in the middle of the pterostigmatic region, and again in the two areas which follow that, coalesce into large irregular blotches: posterior to the sector throughout the disk the edging of the cross-veinlets is very narrow, and in many instances only on the exterior side of the veinlet; and here the cross-veinlets are arranged in about ten broken subparallel curved transverse series at rather regular intervals. The marginal area of the fore wing contains about three cross-veinlets before the bulla and ten beyond it; those in the pterostigmatic region are distinct and fairly straight. Length of wing, 5 mm.

The remaining genera represented in this collection from Tenasserim are:—*Baëtis* by a single ♂ subim. of small dimensions; *Chirotonetes* by a fragmentary ♂ im. in no way remarkable; and *Heptagenia* by two species,—four ♂ im. and four subim. of one, and a subim. of the other species. Hitherto the genus *Potamanthus* has been known only as an European and N. American genus, *Rhoënanthus* from the Malay Archipelago, *Choroterpes* from Europe and America, *Hagenulus* from the Island of Cuba, and *Chirotonetes* from America, Japan, Europe, and Sumatra.