



WITHDRAWN FROM  
CALIF. ACAD. SCI.

EPHEMERELLA HECUBA EATON; DESCRIPTION OF VARIOUS STAGES. (EPHEMERIDA, BAETIDAE).

BY DAVID SHEPHERD,

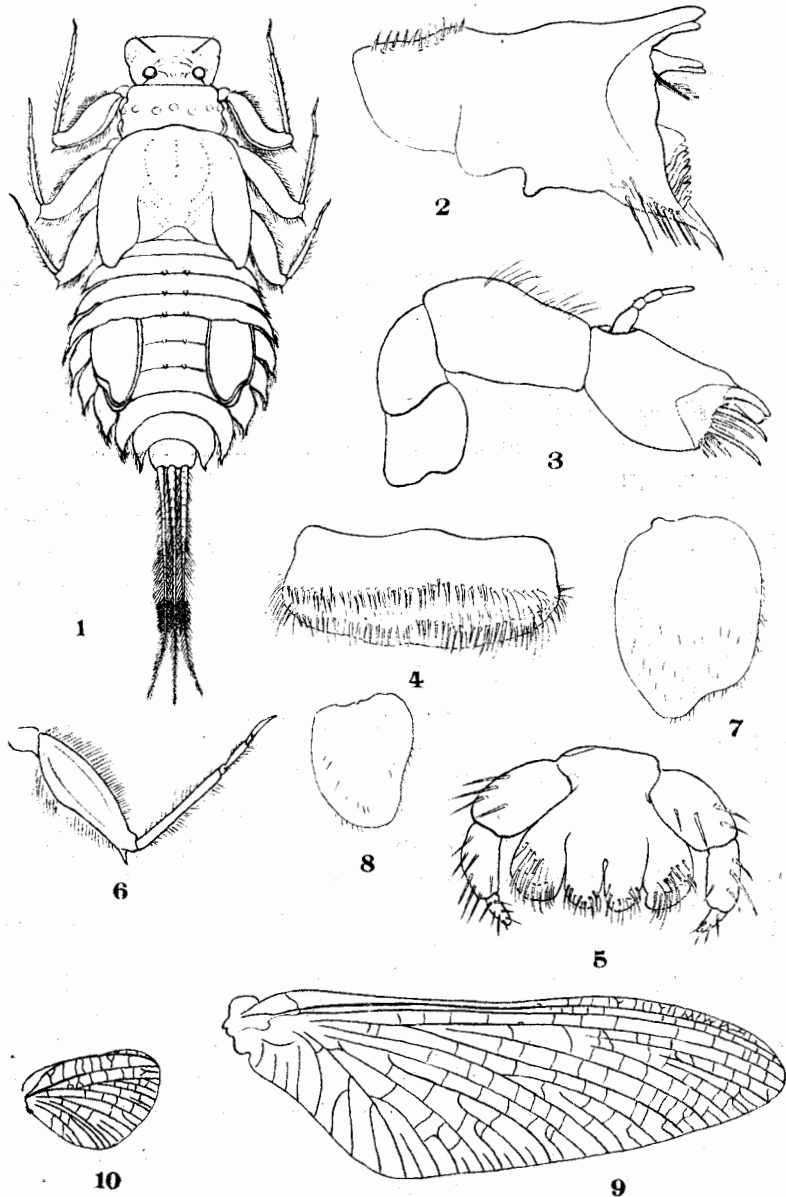
Stanford University, California.

While making a study of the aquatic fauna of Waddell Creek, Rancho del Oso, California, during the summer of 1928, the author collected, along with nymphs of several genera of Ephemerids, nymphs of *Ephemerella hecuba* Eaton figured by Eaton in his Revisional Monograph, page 133, Plate 40, figures 1-17, and by Needham in the Annals of the Entomological Society of America, volume 20, page 115, and in Bulletin 201, Utah Experiment Station, page 9. Inasmuch as the author was unable to find descriptions of the male and female imagoes in the literature he reared out adults, both male and female, in order to secure material for description. Subimagoes appeared July 11 and the imagoes issued July 12.

A description of the nymph, male imago, female imago and egg follows:

*Nymph.* (Plate 10, Fig. 1.) Length of body 15 mm. width in region of 5 abdominal segment 7 mm. Length of setae 7.5 mm.

Head light brown in color, small as compared with rest of body, sub-quadrangular in shape, narrower than pronotum posteriorly, wider at the cephalic margin; frons flattened anteriorly, projecting over mouth parts, truncate in front, minutely spinulose anteriorly, pilose at the sides and front, rounded off at the anterior lateral margin, posterior margin straight, narrowing posteriorly. Labrum (Plate 10, Fig. 4.) transverse, emarginated in front, rounded at the anterior corners. Compound eyes black, prominent, located in posterior lateral angles of head. Antennae inserted about mid-way between the middle of the frons and the lateral margins, long, slender; first two segments heaviest, apical three segments bearing whorls of hairs. Mandibles (Plate 10, Fig. 2.) heavy, sub-quadrangular in shape bearing, on the inner distal surface, a heavy molar surface terminating in a sharp fang like tooth, on the median anterior surface a tuft of hairs, on the outer and apical margin a pair of tooth like lobes. Apically the maxilla (Plate 10, Fig. 3) bears on the inner margin a number of light yellow setae, on the outer margin two blunt lobe-like teeth near the margin of which are two long yellow teeth. Maxillary palpi of four divisions, first segment twice as long as the second, terminal segment as long as first and second combined.



1. Nymph, dorsal view. 2. Mandible of Nymph. 3. Maxilla of Nymph. 4. Labrum of Nymph. 5. Labium of Nymph. 6. Anterior leg of Nymph. 7. First gill from right side. 8. Last gill from right side. 9. Anterior wing, ♀ imago. 10. Posterior wing, ♀ imago.

Pronotum transverse, sub-quadrangular, wider at posterior than anterior margin, gently arched and slightly flattened at the lateral margins; provided with a short conical tubercle on either side near the middle lateral margin as well as with less prominent tubercles extending across the posterior third of the segment.

Legs pilose, median coxae armed above with a short conical tubercle, femora prolonged distally into an acute spine, black band surrounding basal and apical regions of tarsi. Anterior leg (Plate 10, Fig. 6.) pilose, femur prolonged at knee into short acute spine.

Abdomen stout, wider than prothorax in region of 5th abdominal segment, narrowing anteriorly and posteriorly from this point; dorsum convex bearing blunt spines from segments 2-7; venter somewhat convex. Pleura in the form of recurved teeth, pilose in region not covered by tracheal branchiae, penultimate segment longest.

Laminae of gills (Plate 10, Figs. 7 and 8.) emarginate below the tip, the remaining laminae entire. (Plate 10, fig. 8.)

Caudal setae three in number, of equal length, median seta plumose, lateral setae lightly ciliated at the base, more heavily ciliated at the distal third; black band across the distal third of all setae.

*Imago*, ♂. (Plate 11, Fig. 1.) Alcoholic specimen. Length of body 15 mm. length of anterior wing 13 mm. Length of setae 10 mm.

Head mottled brown with whitish margins, occupied largely by turbinate superior portion of the compound eyes the upper portions of which are light brown the lower divisions black. Ocelli prominent, outer margins black, inner areas white. Antennae prominent, length 1.3 mm. basal segments 1 and 2 light yellow, remaining segments brown.

Pronotum sub-quadrangular, anterior margins greater in width than posterior margins, rounded at the anterior lateral margin, mottled brown, carinae reddish. Mesonotum brown in anterior median portion, reddish brown for the remainder of the posterior region. Metanotum light yellow.

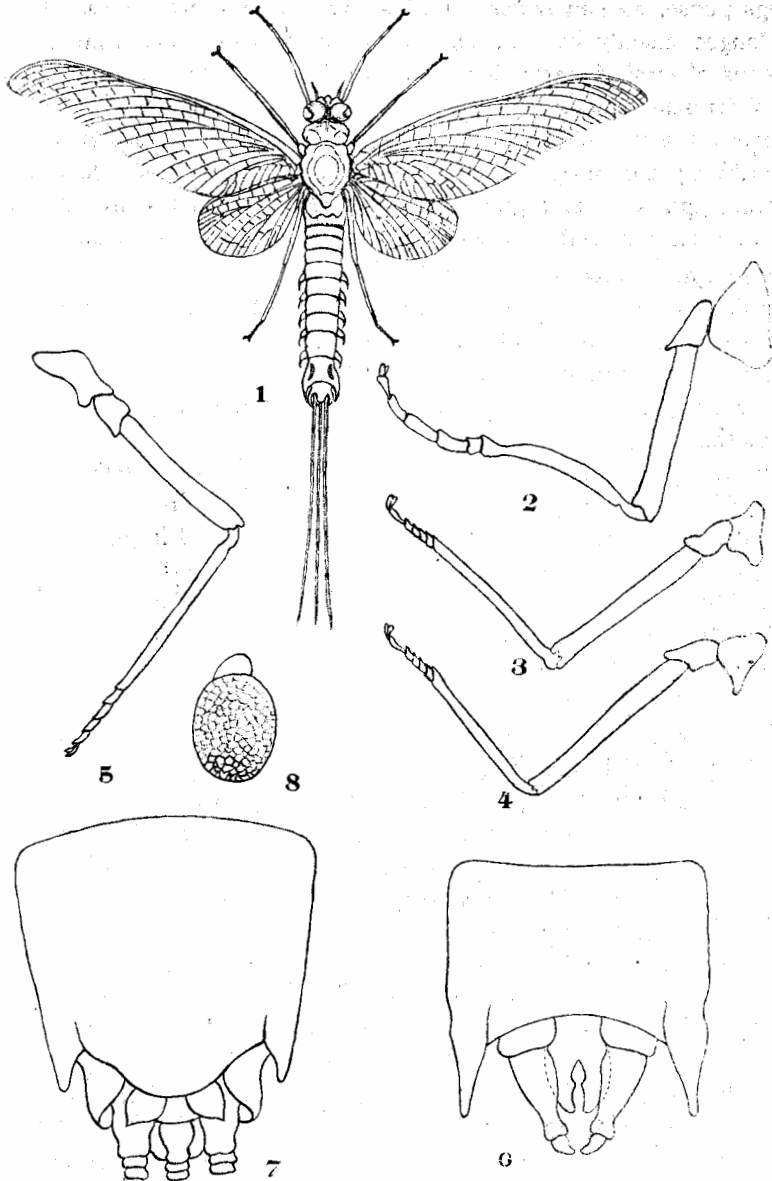
Dorsum of abdomen; first four tergites dark yellow with transverse reddish stripes which widen posteriorly and laterally in comma-shaped figures, light yellow circular spots on either side of the median portion of the tergites which increase in size and distinctness posteriorly. Remaining tergites almost entirely covered by reddish bands posteriorly, and circular white spots anteriorly, one on either side. On anterior margins of each sternite is a prominent reddish band which widens laterally almost completely covering the lateral margins of each sternite; posteriorly each sternite bears a somewhat semilunar-shaped yellow strip. Penultimate and terminal abdominal segments project laterally and posteriorly into obtuse spine-like teeth.

Persistent respiratory gills, of the nymph, filamentous, prominent, dark brown almost black, borne laterally on segments 4-8.

Legs. (Plate 11, Figs. 2, 3, 4.) Anterior coxa light yellow; trochanter reddish brown ending distally in a spine like tooth; femur dark brown, margins almost black; tibia curved, notched at the anterior proximal margin, first segment of tarsi one third length of second.

Wings. (Plate 10, Figs. 9 and 10.) Semi-hyaline, venation distinct.

Genitalia (Plate 11, Fig. 6.) Forceps light yellow, three jointed, stout, in-



1. Dorsal view, ♂ imago. 2. Anterior leg, ♂ imago. 3. Median leg, ♂ imago. 4. Posterior leg, ♂ imago. 5. Anterior leg, ♀ imago. 6. Genitalia, ♂. 7. Ventral view, penultimate and terminal segments, ♀. 8. Eggs.

termediate joint long, conspicuously constricted beyond the middle, other joints short, distal joint emarginated at posterior half. The bifurcations of penis with inner margins slightly irregular.

Imago. ♀. Alcoholic specimen. Length 16.5 mm. Length of anterior wing 18 mm. Length of setae 16 mm.

Head fulvo-aeneous with lighter margins, a fuscous semi-circular spot extending over lateral median region posteriorly to base of antennae. Vertex fulvo-aeneous. Ocelli white somewhat stalked, bases fuscous. Antennae 9 mm. in length, basal segment fuscous, remaining segments lighter brown. Compound eyes of a light purplish hue.

Pronotum fulvo-aeneous with a broad, irregular, median, transverse fuscous band and a thin black line extending around the lateral and posterior margins. Mesonotum fulvous, metanotum dark olivaceous.

Abdomen above dull olivaceous with irregular lighter green spots on segments 1-8 extending from the median portions of the segments almost to the lateral margins. Dorsum of segments 8 and 9 mottled dark bronze; posterior lateral margins ending in tooth like projections. Abdominal sternites 1-7 dark olivaceous anteriorly, flavescent posteriorly. Posterior sternite of 7th sternite light yellow, egg valve fuscous. Anterior portion of 9 sternite fuscous becoming lighter brown posteriorly.

Persistent respiratory gills, of the nymph, filamentous, black, borne laterally on segments 4-8.

Legs. (Plate 11, Fig. 5.). Coxae yellowish; trochanters slightly darker; femora slightly fuscous near the tip; tibiae and tarsi fulvous.

Wings. (Plate 10, Figs. 9 and 10.). Hyaline, neuration distinct, veins deep brown.

Ninth and tenth segments. (Plate 11, Fig. 7.). Ninth sternite flattened at lateral posterior margin into obtuse tooth-like structures the points of which are directed posteriorly, median posterior margin crescent-shaped, entire. Lateral sub-genital lobes foliate, median sub-genital lobe sub-quadrangular, lateral lobes surrounding cerci laterally and dorsally. Posterior margin of 10th tergite rounded.

Egg. (Plate 11, Fig. 8.). Length .211 mm. width .140 mm. Roundly ovate and yellow. Fine chorionic sculpturing. Deutoplasm heavy. Polar knob roundly ovate and lighter yellow than body of egg.