

Kimmins, D. E.

1934. Notes on the Ephemeroptera of the Godman and Salvin collection, with descriptions of two new species.

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Notes on the Ephemeroptera of the Godman and Salvin Collection, with Descriptions of Two new Species. By D. E. KIMMINS.

SINCE 1905, when it was presented to the British Museum, the Godman and Salvin collection of Central American Ephemeroptera has been kept separate from the main collection of Ephemeroptera. Recently it was decided to combine the two, and as Eaton, who worked this section of the 'Biologia Centrali-Americana,' did not fix the types of the various species described by him from this collection, this will be done in these notes. Wherever possible, the abdomen of the type has been removed and treated with KOH, and figures and descriptions of the genitalia have been made. These preparations have subsequently been mounted in Canada balsam between cover-glasses and reattached to their respective specimens. Eaton's figures and descriptions of these parts were made (in most, if not in all, cases in this work) from dried material, and the increase in the number of described species has rendered it difficult for workers without access to Eaton's types to identify with certainty

some of his species. The following notes and figures are offered in the hope that at least some of these uncertainties may be cleared up. Two new species are described in these notes, based on material to which Eaton applied only a generic name.

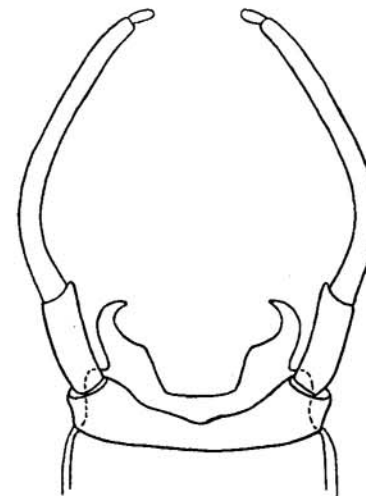
Family **Ephemeridæ.**

Hexagenia mexicana Etn.

Trans. Linn. Soc., Zool. ser. ii. vol. iii. p. 50 (1883); Biol. Centr.-Amer., Neur., Ephem. p. 5, pl. i. fig. 4 (1892).

The genitalia of the ♂ from Atoyac, Vera Cruz, are very well defined. The base of the forceps (fig. 1) is

Fig. 1.



Hexagenia mexicana Etn. ♂.
Genitalia from beneath.

broadly excised and short. Forceps with the basal joint of moderate length, and with a small projection at the inner apical angle; the second joint long and curved; the third joint very small and ovate. Lobes of the penis widely separated, their apices hooked inwards. Between the bases of these hooks is a deep, rather angular excision, the basal margin of which is more strongly chitinated.

At the base of each hook on its external margin there arises a rounded process, or shoulder.

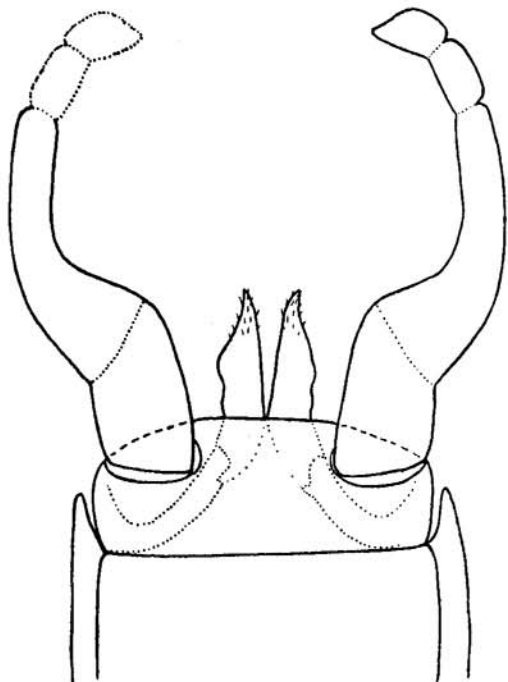
Family Leptophlebiidae.

Choroterpes inornata Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 6, pl. i. figs. 5, 5 a-e (1892).

The type-series in the British Museum now contains 9 ♂ imagines, 1 ♀ imago, and 2 ♂ subimagines. From

Fig. 2.



Choroterpes inornata Etn. ♂ (type).

Genitalia from beneath.

these I have selected as *type* the ♂, from which one hind wing has been removed by Eaton and mounted dry between cover-glasses; the remainder have been marked as paratypes. There is a ♂ paratype from this series in the collection of Mr. J. McDunnough, of the Department of Agriculture, Ottawa. The 2 ♂ subimagines in the

McLachlan collection, mentioned by Eaton, I have not seen.

The line of division between the two basal joints of the ♂ forceps (fig. 2) is rather obscure in a cleared example, and less definite than is shown in Eaton's figure, and

Fig. 3.



Choroterpes inornata Etn. ♀ (paratype).

Ventral lobe from beneath.

the terminal joint is longer and more pointed. The apices of the lobes of the penis carry a few short hairs. Genital stimuli notched near their apices.

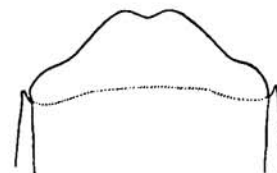
Ventral lobe of the ♀ (fig. 3) triangularly produced, its apex terminating in two small processes, with a semi-circular excision between them.

Choroterpes nervosa Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 6, pl. i. figs. 6, 6 a (1892).

The unique ♀ *type* has the left hind wing detached and mounted between cover-glasses. The anterior leg,

Fig. 4.



Choroterpes nervosa Etn. ♀ (type).

Ventral lobe from beneath.

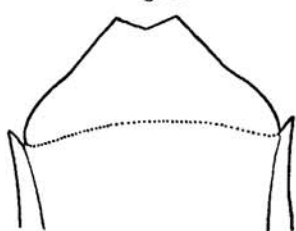
described by Eaton, is now missing. Ventral lobe (fig. 4) produced in the centre, the sides somewhat sinuate, and the apex shallowly excised.

Thraululus primanus Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 7, pl. i. figs. 7, 7 a (1892).

Both the ♂♂ have deteriorated in condition since Eaton's descriptions were made. The anterior and posterior legs, the setæ, and the apex of the abdomen are missing in both specimens. I have selected as the

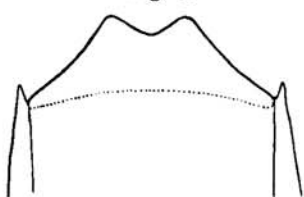
Fig. 5.



Thraululus ? primanus Etn. ♀.
Ventral lobe from beneath.

type the example in which the wings are better preserved. The ♀, which Eaton refers, with some doubt, to this species, lacks the left anterior wing and all legs but the left posterior. The ventral lobe (fig. 5) bears an obtusely-angled excision at its apex. The ♂ type and the ♀ have each one hind wing mounted between cover-glasses.

Fig. 6.



Thraululus versicolor Etn. ♀ (type).
Ventral lobe from beneath.

Thraululus versicolor Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 7 (1892).

From Eaton's series of 4 ♀ imagines and 3 ♀ subimagines I have chosen as type the ♀ imago from Cache, Costa Rica, of which one hind wing has been mounted

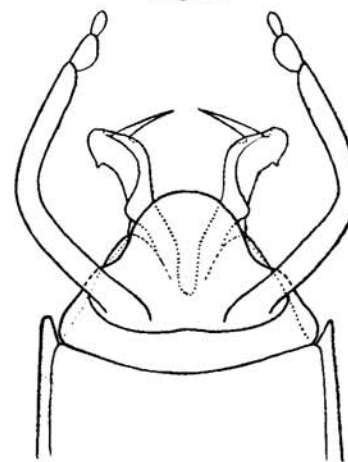
between cover-glasses. The specimen has both anterior legs, the right posterior leg, and one seta. The ventral lobe (fig. 6) terminates in two rounded apices, with a wide, somewhat obtusely angled excision between them. The lateral margins of the lobe are slightly concave.

Thraulodes (Thraululus) lepidus Etn.

Trans. Linn. Soc., Zool. ser. ii. vol. iii. p. 109 (1884) (*Thraululus*);
Biol. Centr.-Amer., Neur., Ephem. p. 8 (1892); Ulmer, Arch. f. Naturg. lxxxv. A, 11, p. 34 (1920) (*Thraulodes*).

I have been unable to examine the type of this species, which is in the McLachlan collection, but I give a figure

Fig. 7.



Thraulodes lepidus Etn. ♂.
Genitalia from beneath.

and description of the ♂ genitalia from one of the two ♂♂ mentioned by Eaton in the 'Biologia Centrali-Americana.' The terminal ventral segment (fig. 7) is produced above the bases of the forceps in a rounded, subtriangular lobe, whose sides have each a shallow excision at about mid-way from base to apex. Beneath the bases of the forceps there is a sinuous ridge, slightly produced centrally. Forceps each with the basal joint long and slender, bent to an obtuse angle about mid-way; second and third joints short, third shorter and much narrower than the second. Lobes of the penis divergent, their apices

rounded and turned more strongly outwards, and each bearing two spines. One, directed inwards and arising from the upper surface, is long and slender, and the other, on the outer lateral margin, is very small and directed basally. Beneath the penis-lobes is a pair of rounded plates. Ventral lobe of the ♀ scarcely different from that of *T. valens* Etn.

Fig. 8.

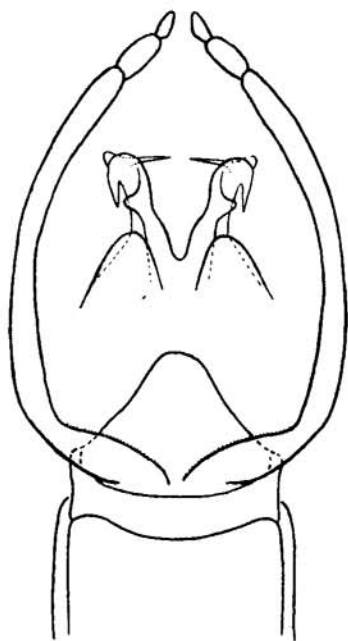
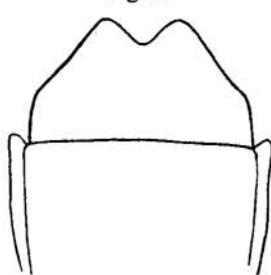


Fig. 9.



Thraulodes valens Etn. ♂♀ (paratypes).

Fig. 8.—♂. Genitalia from beneath, lobes of the penis shown separately.
Fig. 9.—♀. Ventral lobe from beneath.

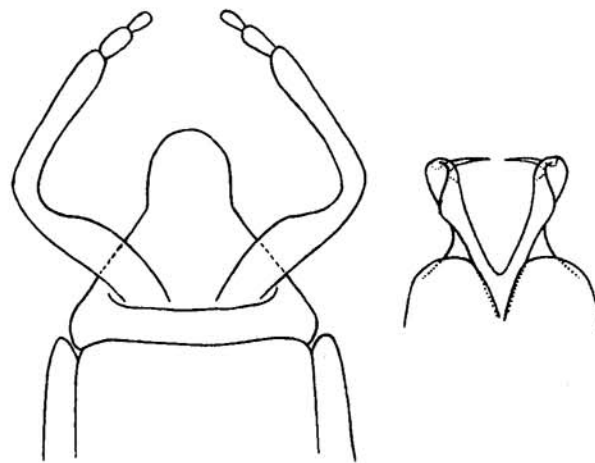
Thraulodes (Thraulius) valens Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 9 (1892) (*Thraulius*); Ulmer, Arch. f. Naturg. lxxxv. A, 11, p. 34 (1920) (*Thraulodes*).

There are four specimens in the type-series, 1 ♂ and 1 ♀ from Boquete, 1 ♂ from Volcan de Chiriqui, and 1 sub-imago from Caldera. From these I select as *type* the ♂ from Boquete, which is well preserved, and lacks only one

anterior and one posterior leg. Terminal ventral segment of the ♂ (fig. 8) produced above the bases of the forceps in an upturned triangular lobe, with a rounded apex; sides slightly concave. Basal joint of forceps long and slender, narrowed and abruptly angled near the base. Remaining two joints short, the third about one-half as long as the second. Lobes of the penis divergent, apices rounded and furnished each with two spines; one, the longer, directed inwards, and the other basally. At the base of the penis-lobes, on the lower surface, is a pair of rounded plates. Ventral lobe of the ♀ (fig. 9) produced to an excised apex, its lateral margins bent outwards, with an obtuse angle near base.

Fig. 10.



Thraulodes hilaris Etn. ♂ (type).

Genitalia from beneath, lobes of the penis shown separately.

Thraulodes (Thraulius) hilaris Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 9 (1892) (*Thraulius*); Ulmer, Arch. f. Naturg. lxxxv. A, 11, p. 34 (1920) (*Thraulodes*).

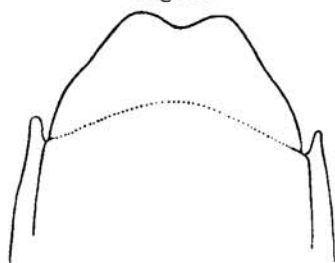
The type-series consists of 1 ♂, San Juan, Vera Paz, and 1 ♀, Teapa, Tabasco. The ♂, which I select as the *type*, has the right anterior leg missing. Terminal ventral segment of the ♂ (fig. 10) above the forceps triangularly produced, ending in an inverted U-shaped

process. Basal joint of the forceps long, elbowed in the middle at about a right-angle; broadest at the base and tapering towards the elbow. Penis-lobes divergent, dilating slightly towards their rounded apices, each of which bear apparently but one spine, directed inwards. Beneath the penis-lobes, at their bases, are two rounded plates.

The ♀ lacks both anterior and one median leg, and all but a fragment of the setæ. Ventral lobe with an excision at its apex and sinuous lateral margins (fig. 11).

The three undetermined species of *Thraulodes*, mentioned in 'Biologia Centrali-Americana' on p. 10, have the

Fig. 11.



Thraulodes hilaris Etn. ♀ (paratype).
Ventral lobe from beneath.

medius in the hind wing forked, and should, therefore, be transferred to *Thraulodes* Ulm.

Family Caenidæ.

Tricorythodes (Tricorythus) explicatus Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 11, pl. i. figs. 8, 8a (1892) (*Tricorythus*); Ulmer, Arch. f. Naturg. lxxxv. A, 11, p. 51 (1920) (*Tricorythodes*); McDunnough, Canad. Ent. lxiii. pp. 267-8, pl. xviii. fig. 13 (1931).

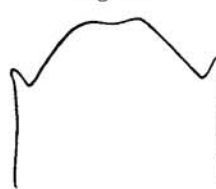
From the long series of this species I have marked as *type* the ♂ of which the left wing and legs have been mounted by Eaton between cover-glasses. 1 ♂ paratype is in the collection of Mr. J. McDunnough, Department of Agriculture. I am not figuring the ♂ genitalia, as Mr. McDunnough has already given an excellent drawing.

Leptohyphes brevissimus Etn.

Biol. Centr.-Amer., Neur., Ephem. p. 12, pl. i. fig. 9 (1892).

The three ♀ imagines in the type-series appear to be little changed since the time of their description. I have chosen as the *type* of the species the example of which

Fig. 12.



Leptohyphes brevissimus Etn. ♀ (type).
Ventral lobe from beneath.

a wing and legs are preserved between cover-glasses. The ventral lobe (fig. 12) is produced triangularly, with a broad, slightly emarginate apex. The specimen is very lightly chitinized and, after softening and clearing in KOH, I have been unable to make out the dividing-line between the lobe and the preceding segment.

Family Baëtidae.

Baëtis salvini Etn.

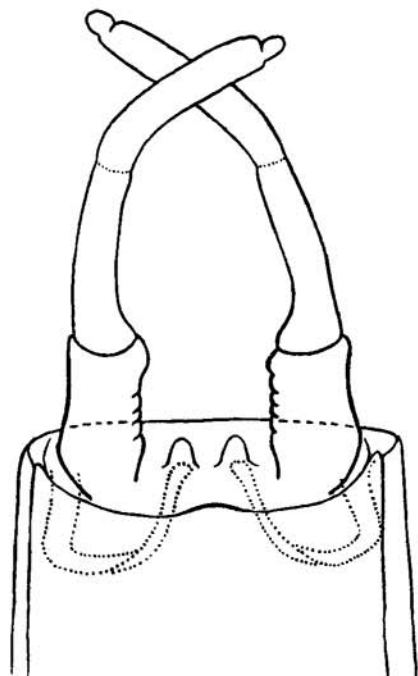
Trans. Linn. Soc., Zool. ser. ii. vol. iii. p. 170, pl. xvi. fig. 29a (1885); Biol. Centr.-Amer., Neur., Ephem. p. 13 (1892).

Eaton based his original description of this species on a ♂ imago and a ♀ subimago from Volcan de Irazu, Costa Rica, and says (p. 171) that the specimens are in the "Salvin and Godman Mus." They do not appear to be in the collection of Ephemeroptera presented to the British Museum by Messrs. Godman and Salvin, and I do not know where these types are to be found. The additional specimens listed by Eaton in the 'Biologia Centrali-Americana' (1 ♂, 3 ♀ imagines, 1 ♂ subimago) are in the British Museum, and I am refiguring and describing the genitalia of the ♂ from Panama, Guatemala.

Basal joint of the forceps (fig. 13) cylindrical, its inner side with four or five transverse wrinkles; second

and third joints subequal, rather longer than the basal, and about one-half as wide; fourth joint small and ovate. Situated on the membrane between the basal joints of the forceps are two thin, lightly chitinized plates, rounded at their apices. Margin of the terminal ventral segment more strongly chitinized and pigmented at its centre. Internal hooks (? genital styles) very weakly

Fig. 13.



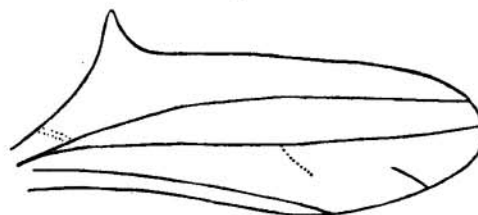
Baëtis salvini Etn. ♂.
Genitalia from beneath.

chitinized and difficult to make out, but apparently sharply elbowed near their bases. The forceps appear more or less pigmented throughout.

Under the heading of "*Baëtis* sp." is a long series from N. Sonora, Mexico. Treatment of a ♂ with KOH revealed well-defined genitalia which I was unable to reconcile with any North American species. Sketches of the

♂ genitalia and hind wing were submitted to Mr. J. McDunnough for his opinion. He replied that my species was very close to *B. quillieri* Dodds. This species was described from the ♀ sex only, and whilst agreeing in the large costal projection of the hind wing, differs somewhat in the shape of the wing and the arrangement of the veins. Unfortunately, one of the ♀ imagoes only in the series possesses hind wings, but these appear to be similar to those of the ♂. I can discern no difference in the genitalia of the two species of *Baëtis* from N. Sonora listed by Eaton. I realise that it is quite possible that the species described below is really *quillieri* of Dodds, but I considered it preferable to risk creating a synonym rather than to cause possible confusion by figuring as *quillieri* an example the determination of which is doubtful.

Fig. 14.



Baëtis eatoni, sp. n. ♂ (paratype).
Hind wing.

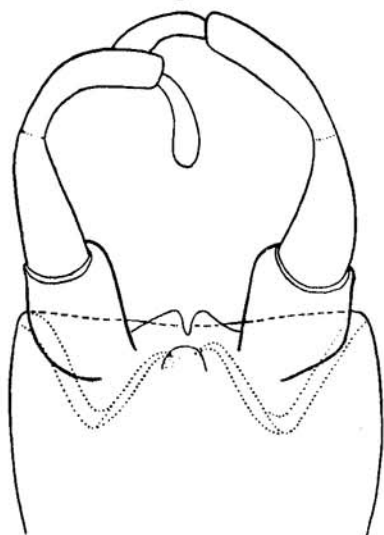
Baëtis eatoni, sp. n.

Eaton, Biol. Centr.-Amer., Neur., Ephem. p. 14 (1892) (*Baëtis* sp.).

♂ (dried).—Turbinate eyes black in the centre, reddish brown at the margins. Head and thorax shining dark brown. Abdomen brown, paler than the thorax, ventral segments slightly paler than dorsal; a darker, reddish-brown line along the lateral margins. Forceps and legs yellowish brown, setæ similar, with darker annulations. Wings hyaline, anterior wing with clear yellow-brown venation, cross-veins distinct; at the extreme base of the wing is a small brownish patch. Posterior wing (fig. 14) rather elongate, with a strong acute costal projection, which is sometimes folded over, giving the appearance of a stout, blunt, process. Three longitudinal veins,

one (or sometimes two) intercalary vein between veins 2 and 3; vein 2 occasionally with the suggestion of a fork. Male forceps, after treatment with KOH (fig. 15), with the two basal joints brownish, and the remainder translucent whitish. No process on the inner apical margin of the basal joint; second joint rather longer than the basal, tapering; the third slightly longer than the second, and expanding towards its apex; fourth joint long, dilated at its apex. Margin of the ninth segment

Fig. 15.



Baëtis eatoni, sp. n. ♂ (paratype).
Genitalia from beneath.

produced and excised in the centre. Between the bases of the forceps there is a small, rounded, raised plate.

Length of fore-wing, ♂ 5 mm.

Length of body, ♂ 4 mm.

Length of setae, ♂ 6 mm.

The female resembles the male, but is more reddish brown in colour. Wings of the subimago fuscous.

Mexico, N. Sonora (*Morrison*), 17 ♂, 2 ♀ imagines, 9 ♂, 14 ♀ subimagines. Holotype, ♂, and paratypes, ♂♀, in the British Museum.

Family Siphonuridae.

Isonychia (*Chirotonetes*) sp.

Eaton, Biol. Centr.-Amer., Neur., Ephem. p. 16 (1892).

I have examined the genitalia of the only ♂ imago in this series; it does not appear to differ appreciably from McDunnough's figure of *Isonychia sicca* var. *manca* Etn. in Canad. Ent. lxiii. p. 158, 1931. The ♂ is larger than the dimensions given by Eaton for the ♀ of *manca*, and the cross-veins in the apical region of the fore-wing are dark brown as in other parts. The pterostigma is brown, and there is a brown spot at the origin of the branch from "vein 4" of Eaton. Owing to the scarcity of material, I am placing these examples provisionally as a variety of *I. sicca* Walsh.

Family Ecdyonuridae.

The examples placed by Eaton as a genus allied to *Cinygma* I consider to belong to the genus *Heptagenia* as recently defined by Traver, and as I have been unable to reconcile it with any of the published descriptions of *Heptagenia* spp. I am describing it below.

Heptagenia salvini, sp. n.

Eaton, Biol. Centr.-Amer., Neur., Ephem. p. 16 (1892) (genus allied to *Cinygma*).

♂ imago (dried).—Head pale brown, eyes black; thorax brown, anterior lateral margins yellowish. Abdomen reddish brown, tergites with the posterior and lateral margins paler. Legs pale brown, apices of femora darker, almost piceous; anterior tarsi (fig. 16) with the joints decreasing in the following order:—2, 3, 4, 5, 1 (not 3, 2, 4, 5, 1 as stated by Eaton). The first tarsal joint is nearly one-third of the length of the second; tarsal claws dissimilar. Wings hyaline, with dark brown venation, pterostigma faintly yellowish brown. Genitalia (fig. 17): base of the forceps with a projection on each side. Apical joint of forceps damaged. Each main lobe of the penis appears trilobed at the apex, the division between the inner and middle lobes being deeper than that between the middle and outer. Three pairs of spines are present, the central pair moderately large, curved downwards, and slightly divergent. The

second pair, situated on the lower surface near the apex, are slender and directed outwards. The third pair, which are much smaller, are placed on the apical margin.

Fig. 16.

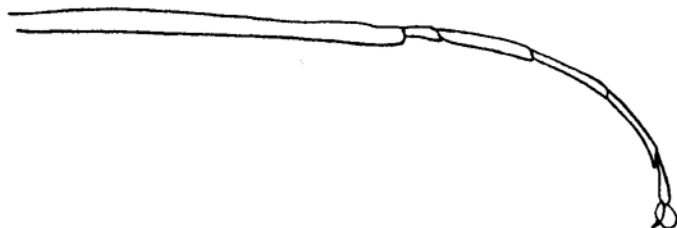
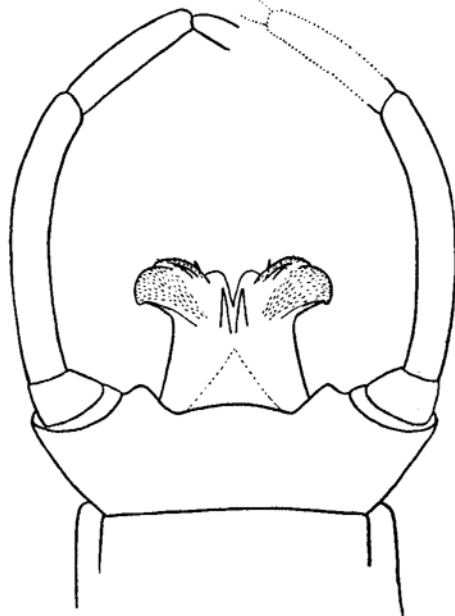


Fig. 17.



Heptagenia salvini, sp. n. ♂ (type).

Fig. 16.—Anterior tibia and tarsus.

Fig. 17.—Genitalia from beneath.

Subimago ♀ (dried).—Wing brownish, veins dark brown, cross-veins slightly shaded.

Length of fore-wing: ♂ imago 9 mm.; ♀ subimago 9–11 mm.

Type ♂ (with apex of abdomen and anterior leg mounted in balsam), 8 paratype ♀ subimagines, Mexico, N. Sonora (Morrison).

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