

B I O L O G I A  
CENTRALI-AMERICANA.

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I N S E C T A.

NEUROPTERA.

*EPHEMERIDÆ.*

BY

THE REV. A. E. EATON, F.R.S.

*ODONATA.*

BY

PHILIP P. CALVERT, PH.D.



1892-1908.

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\* [That for the Ephemeridæ is given on p. 1.—ED.]



## MAP No. 1.

Map showing the distribution of actual mean annual temperatures in Mexico and Central America.

This map, having been specially prepared for this work, requires some explanation. It is based on data from the following sources:—

For the *United States*, Prof. A. J. Henry's "The Climatology of the United States" (Bulletin Q, U.S. Weather Bureau, Washington, D.C., 1906. 4to).

For *Mexico*.—1. A map,  $97 \times 71.5$  cm., in the library of the Academy of Natural Sciences of Philadelphia, inscribed merely "Carta Climatologica. Sebastian Reyes. P. J. Senties. A. Donamette Imp. Escala de 1 : 3,000,000. Gravée chez Monroq fr. Paris." Thanks to the Secretaria de Estado y del Despacho de Fomento Colonizacion e Industria of Mexico, I am informed, under date of July 30, 1907, "que dicha Carta fué publicada en 1889 por disposicion de esta Secretaria, haciendo los trabajos relativos los Sres. Pedro J. Senties, que era Director de la Escuela Nacional de Agricultura y Comisionado de México en la Exposicion de Paris del mismo año y Sebastian Reyes que fué Profesor del Plantel antes mencionado." This map was reproduced without alteration, but on a reduced scale (1 : 6,000,000), in Tomo XI, Anales del Ministerio de Fomento de la Republica Mexicana, Mexico, 1898.

2. A map entitled "Reparticion de la Temperatura en la República Mexicana" for the "Año Meteorológico de 1902," published as Plancha 16, Boletin Mensuel Observatorio Meteorológico-Magnetico Central de México, Noviembre, 1902. Señor Don Manuel E. Pastrana, Director of the Observatorio, has kindly informed me that the maps for later years have not yet been published.

3. I have modified both maps considerably in accordance with a number of temperature data for 70 stations in the State of Vera Cruz and 49 in other parts of Mexico, gathered from all accessible sources (in the libraries of Philadelphia and that of the U.S. Weather Bureau in Washington), chief among which are the Boletin Mensuel above quoted, the publications of Señores Moreno y Anda and Gomez and of Señor J. Guzman, the 'Monthly Weather Review' (Washington, D.C.), the 'Meteorologische Zeitschrift,' various Mexican journals, &c.\*

4. The topography of the country, as given in the map issued by the Bureau of American Republics, Washington, D.C., 1902, and in the authorities cited for Table A in the Introduction of this work, has also been taken into account, since the present map is designed to show the *actual* distribution of temperature in the sense of the last map of plate 6 of Bartholomew's 'Physical Atlas,' vol. iii. Meteorology, and of the explanation of that plate. The limits of the central plateau are taken from the map published in 'Boletin Mensuel,' Observat. Meteor. Magnet. Centr. Mex. for July, 1901. I assume no responsibility for the political boundaries shown.

It should be added that the existence of Zone I, with a mean annual temperature of more than  $30^{\circ}$  C., rests solely on the authority of the map of Senties and Reyes, that it is doubted by Señor Pastrana, and that I have not succeeded in finding any published records of temperature observations in the valley of the Rio de las Balsas for a period of more than two months.

For *Central America*, I have drawn especially upon the observations published by Dr. Karl Sapper and others for Guatemala, chiefly in the 'Meteorologische Zeitschrift,' and by Señor H. Pittier de Fahega for Costa Rica in the same and other journals, particularly those issued under the auspices of the Museo Nacional and Instituto Físico-Geográfico de Costa Rica. The data for Guatemala and Costa Rica indicate that in those countries the annual isotherms of  $25^{\circ}$ ,  $20^{\circ}$ ,  $15^{\circ}$ ,  $10^{\circ}$ , and  $5^{\circ}$  C. are situated approximately at elevations of 270, 1160, 2050, 2950, and 3840 metres respectively. The present map, so far as Central America is concerned, has been made from the topographical maps of Dr. Sapper (Petermann's 'Mittheilungen,' l. 1904, Ergänzungsband xxvii. 1899, and Heft 151, 1905; and 'Mittelamerikanische Reisen und Studien,' Braunschweig, 1902) and of the Bureau of American Republics by using these equivalents.

PHILIP P. CALVERT.

Philadelphia, November 1908.

\* The collection of mean annual temperatures in Mexico and Central America made for this map has been published in the 'Monthly Weather Review,' vol. xxxvi. no. 4, pp. 93-97, April, 1908. Issued June 16, 1908.

# BIOLOGIA CENTRALI-AMERICANA.

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## ZOOLOGIA.

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### Class INSECTA.

### Order NEUROPTERA.

### Fam. EPHEMERIDÆ\*.

Materials for the account here given of the Ephemeridæ or Mayflies of Central America have been derived from the undermentioned collections and museums:—The collections of Messrs. Godman and Salvin, R. McLachlan, Baron E. de Selys-Longchamps; and the Museum of Comparative Zoology, Cambridge, Mass., the British Museum, and those of Brussels and of the Jardin des Plantes at Paris. These have yielded representatives of fourteen named and two unnamed genera, and nineteen named and thirteen unnamed species: total sixteen genera and thirty-two species, excluding a specimen of no account. Eight species are described as new.

Most of the genera of Ephemeridæ represented in the Central-American fauna have an extended range. About one-third of the number have been observed only in America, and two (including an unnamed genus) have not been found outside our limits. Particulars concerning their geographical range are given under the head of each genus; but it should not be forgotten that the distribution of Mayflies inhabiting tropical and subtropical countries is a subject with regard to which very little is known.

The following Table (p. 2) shows the number of species that are now known from Central America, and in what portion of that country they have occurred.

The genera are here classified in accordance with the plan adopted in "A Revisional Monograph of Recent Ephemeridæ or Mayflies," in the Transactions of the Linnean Society of London, 2nd series, Zoology, iii. (1883–1888), cited as 'Eaton, Rev. Mon. Ephem.'

An analytical key to the genera and larger divisions of the family will be found in that volume, commencing at p. 309.

\* By A. E. EATON.

Genera.	Net Total of Species [ ] = undescribed in Central America.	Distribution in								and Other parts of the World.
		Central America								
		Mexico.	British Honduras.	Guatemala.	Salvador.	Honduras.	Nicaragua.	Costa Rica.	Panama.	
<i>Lachlania</i> .....	1	..	..	1	..	..	..	..	1	Cuba.
<i>Homœoneuria</i> ..	1	..	..	1	..	..	..	..	..	
<i>Euthyplocia</i> .....	1	1	..	1	..	..	..	..	1	Tropical South America.
<i>Campsurus</i> .....	2+[1]	1	[1]	1	..	..	..	..	..	Texas, Brazil.
<i>Hexagenia</i> .....	1	1	..	..	..	..	..	..	..	Canada to Brazil, India.
<i>Choroterpes</i> .....	2	1	..	1	..	..	..	..	..	Arizona, Europe, Tenasserim.
<i>Thraulius</i> .....	6+[3]	3+[1]	..	1+[2]	..	..	..	1	4	Colombia, Europe, Indo-Malayan Region.
Gen. — .....	[1]	..	..	[1]	..	..	..	..	..	
<i>Ephemerella</i> .....	[1]	[1]	..	..	..	..	..	..	..	Northern Temperate Region.
<i>Tricorythus</i> .....	1	1	..	..	..	..	..	..	..	Egypt, S. Africa, Malayan Region.
<i>Leptohyphes</i> .....	1	..	..	1	..	..	..	..	..	Argentine Republic.
<i>Baëtis</i> .....	1+[3]	[3]	..	1	..	..	..	1	..	Nearly everywhere.
<i>Centroptilum</i> .....	[1]	[1]	..	..	..	..	..	..	..	Cuba, N. America, Europe.
<i>Callibaëtis</i> .....	2+[1]	1+[1]	..	2	..	..	..	..	..	N. and S. America, Australia.
<i>Chirotonetes</i> .....	[1]	[1]	..	[1]	..	..	..	..	..	N. America, Europe, Indo-Malayan Region, Japan.
Gen. — .....	[1]	[1]	..	..	..	..	..	..	..	

The unnamed genus following *Thraulius* in the above table of geographical distribution works out with *Adenophlebia*; their differences are set forth below in the description. The other unnamed one, next to *Chirotonetes*, is related to *Cinygma*, a N.-American genus.

### LACHLANIA.

*Lachlania*, Hagen, Proc. Bost. Soc. Nat. Hist. 1868, pp. 372-374 (woodcut).

This genus contains a Cuban species in addition to the one from Central America.

1. **Lachlania lucida.** (Tab. I. figg. 1, ♀ ; 1 a, fore wing, showing the aberrant neuration.)

*Lachlania lucida*, Eaton, Rev. Mon. Ephem. p. 35, t. 3. fig. 5 (details) (1883)<sup>1</sup>.

*Hab.* GUATEMALA (♂ and ♀, in *Mus. Jardin des Plantes, Paris*<sup>1</sup>), El Reposo 800 feet, Cerro Zunil 4000 feet (*Champion*; ♀); PANAMA, Bugaba 800 feet (*Champion*; ♀).

Other female specimens without precise record of locality are contained in the collections of Mr. McLachlan and Messrs. Godman and Salvin. The three female examples captured by Mr. Champion show the head and pronotum less luteous and rather more piceous than the remainder of the notum; the wing-membrane comparatively dull, but reflecting medium smalt-blue; and the length of wing 11–12, setæ 8–9 millim. The corresponding admeasurements given in Eaton, *op. cit.* p. 35, were ♀ wing 14, setæ 7 millim.

#### HOMŒONEURIA.

*Homœoneuria*, Eaton, Ent. Monthly Mag. xvii. p. 192 (1881).

A genus of a single species.

1. **Homœoneuria salviniae.** (Tab. I. fig. 2, ♀.)

*Homœoneuria salviniae*, Eaton, Ent. Monthly Mag. xvii. p. 192<sup>1</sup>; Rev. Mon. Ephem. p. 36, t. 3. fig. 6 (wings) (1883)<sup>2</sup>.

*Hab.* GUATEMALA<sup>1</sup>, Dueñas 4950 feet, and Aceytuno 5100 feet (*Salvin*<sup>2</sup>).

These specimens were given to Mr. McLachlan on Mr. Salvin's return from Guatemala in 1874. They were taken from the surface of a tank at Aceytuno and from the small stream which drains the lake of Dueñas.

#### EUTHYPLOCIA.

*Euthyplocia*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 67, t. 1. figg. 8, 8 a (parts of wing); Rev. Mon. Ephem. p. 36, tt. 4, 29 (adult details and nymph) (1883).

A genus of few published species, ranging from Mexico southwards into Brazil. A subimago, from Madagascar, in the British Museum, may represent a kindred genus, hitherto undescribed.

1. **Euthyplocia hecuba.** (Tab. I. figg. 3, 3 a, ♀.)

*Palingenia hecuba*, Hagen, Synopsis Neuropt. N. Am. p. 40 (1861)<sup>1</sup>.

*Euthyplocia hecuba*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 67<sup>2</sup>; Rev. Mon. Ephem. p. 37, t. 4. fig. 7 a<sup>1</sup>.

*Imago (dried).*—♂. Head brown-black; pronotum pitch-brown; the remainder of the notum a lighter and rather yellower brown, but less decidedly luteous than in the other sex. Dorsum of abdomen intense vandyke-brown, with opaque joinings, and with the usual pale comma-like dots (marking probably the places of the valves of the dorsal vessel); venter whity-brown (in ♀ very pale ochre after oviposition), shaded with a very light grade or grey of the dorsal brown. Forceps and setæ dirty white, the joinings of the



latter pale. Fore femur pitch-brown; tibia more translucent, in some lights sepia-grey; tarsus dull whitish. Wings as in ♀.

Length of wing, ♂ 26, ♀ 23-27; median seta broken off in the largest ♀ specimen at 48 millim.

*Hab.* MEXICO, Vera Cruz (*Sallé*<sup>2</sup>, in *Mus. de Selys-Longchamps*<sup>1 3</sup>); GUATEMALA, Aceytuno 5100 feet (*Salvin*), San Isidro 1600 feet (*Champion*); PANAMA, Volcan de Chiriqui (*Champion*), Veraguas (*Mus. McLachlan*<sup>3</sup>).

The male is described now for the first time, from two specimens obtained on the Volcan de Chiriqui, which match well with a female from San Isidro. Two females of similar dimensions, from Aceytuno, may have been subjected to the action of some poison or preservative; they have the wings paler, for the most part less rosy and rather dirty; their meso- and metanotum are more distinctly luteous, but this may be due to the infiltration of shellac, which seems to have been used in attaching them to the pins. The smallest female is from Chiriqui; it has the wings tinted with rosy-grey, rather more strongly than those of the males from the same locality, or than those of the female from San Isidro; its eggs are retained, and the venter is yellow longitudinally in the middle and brown at the sides. The ♂ forceps of the specimens referred to are so curved and twisted out of shape as to render their representation inadvisable.

### CAMPSURUS.

*Campsurus*, Eaton, Ent. Monthly Mag. v. p. 83 (1868); Rev. Mon. Ephem. p. 38, t. 5 (adult details) (1883).

A genus spread over a large part of South America, and extending northwards to Texas; species probably numerous. In dried specimens the chief distinctions lie in the ♂ genitalia; but sometimes the facies of the neuration, especially that of the hind wings, may serve for their discrimination. Female specimens can seldom be identified with certainty, apart from flies of the other sex associated with them in the same localities.

#### 1. *Campsurus decoloratus*.

*Palingenia decolorata*, Hagen, Synopsis Neuropt. N. Am. p. 43 (1861)<sup>1</sup>.

*Hexagenia decolorata*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 65<sup>2</sup>.

*Campsurus decoloratus*, Eaton, Rev. Mon. Ephem. p. 41 (after Hagen) (1883)<sup>3</sup>.

*Hab.* MEXICO, Matamoros in Tamaulipas<sup>1</sup> (*in Mus. Comp. Zoöl. Cambridge, Mass.*<sup>2 3</sup>).

#### 2. *Campsurus* — ?

*Hab.* BRITISH HONDURAS, R. Sarstoon (*Blancaneaux*).

One female imago, in Messrs. Godman and Salvin's collection. This specimen, shattered to pieces in transmission by post, does not suffice for description.

#### 3. *Campsurus cuspidatus*.

*Campsurus cuspidatus*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 58, t. 3. fig. 12<sup>1</sup>; Rev. Mon. Ephem. p. 40, t. 5. fig. 8 *d* (1883)<sup>2</sup>.

*Hab.* GUATEMALA (one ♂ imago, in *Mus. de Selys-Longchamps*)<sup>1 2</sup>.

Both the figures quoted are derived from the same original drawing.

### HEXAGENIA.

*Hexagenia*, Walsh, Proc. Ent. Soc. Phil. ii. p. 197 (1863).

This genus is chiefly known from the New World, where it extends at least from Canada to Buenos Ayres. There is, however, in Mr. McLachlan's collection, a specimen from N.W. India; *cf.* Eaton, Rev. Mon. Ephem. t. 7. fig. 11 *a* (1883) (undescribed). Some of the American species have a very extended range.

#### 1. *Hexagenia mexicana*. (Tab. I. fig. 4, ♂.)

*Hexagenia mexicana*, Eaton, Rev. Mon. Ephem. p. 50 (1883).

*Hab.* MEXICO (*Sallé*<sup>1</sup>; one ♂ imago in *Mus. Hagen*), Atoyac in Vera Cruz (*Schumann*; one ♂ imago).

The latter specimen enables the published description to be supplemented as follows:—

Dorsum of abdomen pitch-black, with a single longitudinal series of translucent triangular subochreous spots on each side of the median tract, extending from the second to the ninth segment. These spots, situated very near the bases of the segments, are isolated by a considerable breadth of the dark ground-colour, which tends to invade their lower angles; those towards the commencement of the series have their upper anterior angle right-angled, but the corresponding angles of the hinder spots become more obtuse. Venter light burnt-umber, or warm sepia-brown; the ninth segment darker, except in the median tract; on each side of the anterior segments a dark streak runs backwards from the basal angle. Forceps to the beginning of the second joint of the limbs almost concolorous with the ninth segment, and then pitch-black to the tips. *Setæ* piceous. In this specimen the only portions of the hinder legs that are distinctly pitch-brown are the terminal joint and the unguis; elsewhere the traces of this colour are very faint.

Length of wing 16, body 19 millim.

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Many of the Mayflies of the *Leptophlebia*-type in Messrs. Godman and Salvin's collection probably represent new genera. But until both sexes of the flies and their nymphs are known, it will be best, perhaps, to place them provisionally in the named genera to which they are most nearly related, and to state the points wherein they appear to depart from the normal standards of those genera. This is said with particular reference to species here referred to *Thraulus* and the following genus.

### CHOROTERPES.

*Choroterpes*, Eaton, Ent. Monthly Mag. xvi. p. 194 (1881); Rev. Mon. Ephem. p. 104, t. 12. fig. 19 (adult details), and t. 34 (nymph) (1884).

Besides a single European species, and one (*in Mus. McLachlan*) from Tenasserim Valley, which is normal, the genus includes the two following.

### 1. *Choroerpes inornata*, sp. n. (Tab. I. figg. 5, 5 *a-e*, ♂.)

*Subimago (dried)*.—Wings uniformly sepia-grey, with warm sepia, opaque neuration.

*Imago (dried)*.—♂. Thorax pitch-black above (probably jet-black during life); dorsum of abdomen ivory-black or blackish-brown, sometimes with the joinings of the segments whitish, and sometimes with the tract of the dorsal vessel translucent whitish, and in segments 4–8 with a short tapering longitudinal whitish streak from the base in its immediate proximity on each side. Venter dull impure whitish; the last segment pitch-brown, and the nerve-ganglia dark. Setæ warm sepia-grey; the joinings dark. Forceps rufo-piceous (usually greatly distorted through desiccation); the basal joints of the limbs relatively longer than in the typical species, being equal in length to the penis-lobes. Legs in opaque view pitch-brown; in transmitted light rufescent. Wings vitreous: fore wing pitch-brown at the extreme roots; cross veinlets attenuated, invisible to the naked eye, numerous in the marginal area of the fore wing, and mostly simple in the pterostigmatic region, numbering about 8 before, and 11–15 beyond the bulla; hind wing normal.

♀. Neuration stronger than in the other sex, yet the cross-veinlets when held up to the light are only just discernible without a lens; those in the marginal area of the fore wing number about 4 before and many beyond the bulla. Pleura of the ninth segment produced acutely; (ventral lobe shrunken out of shape in the only specimen obtained). Abdomen pitch-brown.

Length of body, ♂ 6, ♀ 8; wing, ♂ 7, ♀ 9 millim.

*Hab.* MEXICO, Northern Sonora (*Morrison*: two ♂ subimag. and ten imag.; one ♀ imag.), Arizona (two subimag. *in Mus. McLachlan*; alluded to in *Rev. Mon. Ephem.* p. 105).

### 2. *Choroerpes nervosa*, sp. n. (Tab. I. figg. 6, 6 *a*, ♀.)

*Imago (dried)*.—♀. Aberrant from the type in the profusion of cross-veinlets in the wings, in the marginal area of the hind wing ending abruptly (as in *Thraulius bellus*) not obliquely, and in the submarginal area of the same wing extending almost to the tip. Also the lobe of the ninth ventral segment is seemingly retuse.

Body pitch-brown above, the meso- and metanotum inclining to rufo-piceous; venter rather lighter than the dorsum. Fore femur dark pitch-brown; tibia somewhat rufo-piceous; tarsus lighter, in some postures impure light yellowish-brown, with the first four joints darker at the tips and dorsally, but with the base of the first joint and the whole of the fifth joint, ungues included, light yellowish or subochraceous. (Hinder legs and setæ lost.) Wings vitreous: fore wing tinted throughout the marginal and submarginal areas, and also about the wing-roots, with light piceous-grey; many of the longitudinal nervures for some distance from the roots are narrowly clouded with the same grey. Neuration distinct to the naked eye, pitch-brown in opaque view, but rufo-piceous in transmitted light; marginal area of the fore wing with about ten to twelve cross-veinlets before, and thirty-two beyond the bulla, not reckoning numerous traces of others that are obsolete. Pleura of the ninth abdominal segment subobtuse behind; (ventral lobe of the same segment shrunken, but apparently retuse).

Length of body 10·5; wing 15 millim.

*Hab.* GUATEMALA, Zapote (*Champion*; one ♀ imag.).

### THRAULUS.

*Thraulius*, Eaton, *Ent. Monthly Mag.* xvii. p. 195 (1881); *Rev. Mon. Ephem.* p. 106, t. 12. fig 20 (adult details), t. 35. (nymph); also (provisionally) t. 13. figg. 20<sup>2</sup>, 20<sup>3</sup>, 23<sup>2</sup>, 23<sup>3</sup>, and 23<sup>4</sup> (adult details) (1884).

Probably a large genus in the tropical and warmer temperate parts of America, represented by a few species in the Indo-Malayan region, and by one species in S.W. Europe that extends northwards to Indre in France.

Subdivision of the genus may be expected to be necessary, having regard to marked differences in the genitalia of the better known species. The presence or absence of cross-veinlets before the bulla of the subcosta in the submarginal area of the fore wing seems to be of minor importance; and the hind wing may vary a little in shape with the sex, the costal elbow perhaps being farther from the wing-roots in the female than in the male, as is the case in many Ephemeridæ. Further material is needed for the elucidation of these points.

### 1. *Thraulus primanus*, sp. n. (Tab. I. figg. 7, ♀; 7 a, ♂.)

*Imago (dried)*.—♂. Femora not banded. Hind wing less oblique than in the typical species (*Th. bellus*), with the costal elbow nearly opposite the middle of the wing; subcosta straight, parallel with the costa as far as the elbow, and ending abruptly at a cross-veinlet; radius nearly straight, ending before the apex of the wing, joined by three veins (of which the nearest to the apex is forked and the others simple) and followed by another vein; cross-veinlets very few.

Body pitch-brown. Legs, in opaque view, intense piceous; fore tarsus translucent light bistre-brown, shifting to a darker tint of the same. Setæ brownish-grey, with some of the joinings opaque or blackish. Forceps stout; apical joint oval. Wings vitreous; the fore wing in its basal half, and in the marginal area up to the bulla, faintly tinted with very light pitch-brown; the hind wing similarly tinted throughout. Neuration in opaque view light pitch-brown, shifting to golden-brown; longitudinal neuration fairly distinct to the naked eye over white paper; cross-veinlets numerous in the apical half of the wing and in proximity to the margin thereabouts; marginal area of the fore wing with traces of ten obsolete cross-veinlets before the bulla, and about fourteen simple veinlets beyond it.

♀ (*dried*) (either of this species or of a near ally). Fore wing clear, except at the extreme base; neuration rather lighter in tint than in the ♂, and the cross-veinlets more numerous—nine before and about twenty-four beyond the bulla in the marginal area; longitudinal neuration fairly distinct to the naked eye. Costal elbow beyond the middle of the hind wing; neuration much the same as in ♂; cross-veinlets few. (Ventral lobe of ninth segment shrunken.)

Length of body, ♀ 9; wing, ♂ 9, ♀ 13 millim.

*Hab.* MEXICO, Atoyac in Vera Cruz (*Schumann*; two ♂ imag.), Teapa in Tabasco (*H. H. Smith*; one ♀ imag.).

### 2. *Thraulus versicolor*, sp. n.

*Imago ♀ and subimago ♀ (dried)*.—Femora not banded. Hind wing similar in plan of neuration to that of *Th. primanus*.

*Imago*.—Body light pitch-brown, with the metathorax lighter and more of a light raw umber-brown; abdominal joinings opaque. Legs in opaque view very intense bistre or pitch-brown, approaching pitch-black; tarsi and coxæ light raw umber-brown. Setæ intense pitch-brown. Wings vitreous, uniformly tinted with bistre-grey. Neuration in opaque view piceous, in transmitted light bistre-brown; longitudinal nervures fairly distinct to the naked eye; cross-veinlets numerous in the apical half of the wing and along the outer margin; marginal area of the fore wing with traces of two or three obsolete cross-veinlets before the bulla, and about thirteen cross-veinlets beyond it.

*Subimago*.—Wings and neuration subopaque white, tinged at the extreme roots with violet-black or grey-black. Legs intense pitch-brown, with the tarsi yellowish-white. (Setæ shrunken, probably piceous. Body faded.) Thorax varying from pitch-black to medium bistre-brown.

Length of wing, imag. and subimag., 11–12; setæ, imag., 9 and 14 millim.

*Hab.* COSTA RICA, Caché (*Rogers*; three ♀ imag. and three ♀ subimag.); PANAMA, Volcan de Chiriqui 3000 feet (*Champion*; one ♀ imag.).

### 3. *Thraulus mexicanus*.

*Thraulus mexicanus*, Eaton, Rev. Mon. Ephem. p. 109, t. 13. fig. 23\*<sup>4</sup> (details) (1884) (*Calliarcys mexicanus* in the writing of the plate cited)<sup>1</sup>.

*Imago (dried)*.—♂ described and illustrated (hind wing and genitalia) in the work cited.

♀. Femora banded. Costal elbow nearly opposite the middle of the hind wing; subcosta slightly curved, produced past the cross-veinlet from that elbow to the margin below the elbow; stem of the radius directly continuous with the two cross-veinlets extending in a curved line from it to the costal elbow (the figure cited, fig. 23\*<sup>4</sup>, needs perfecting hereabouts—the subcosta and radius should not be represented as attenuated before their intersection with the cross-veinlets, but only beyond that). Ventral lobe of the ninth abdominal segment obtusely rounded and entire.

Thorax raw umber-brown. Abdomen pitch-brown, opaque at the joinings. Fore femur pitch-brown; tibia impure whitish, with the base and a broad band just before the extreme tip pitch-black; tarsus black, except the whitish first two joints and the joinings; ungues pitch-brown. Intermediate femur pitch-brown, with the extreme base and the tip and a narrow band before the middle whitish; hind femur rather whiter in the basal half. Hinder coxæ and trochanters whitish; tibiæ whitish, with the extreme tip black; tarsi whitish, with the last joint and the bases of the intermediate joints blackish. Wings vitreous, with a pitch-brown stain at the great cross-vein and at the bases of the main nervures enclosing a clear space at the extreme roots; neuration (over white paper) indistinct to the naked eye and pale, shifting in oblique view to light brownish. Cross-veinlets fairly numerous in the disk of the fore wing, arranged in about eight irregular transverse series reckoning along the sector from its junction with the cubitus, but scarce towards the hind margin: none before the bulla, but nine beyond that in the marginal area, all simple.

Length of wing, ♀, 8 millim.

*Hab.* MEXICO (*Mus. Brussels*; ♂ imag.<sup>1</sup>); PANAMA, Bugaba 1000 feet (*Champion*; one ♀ imag.).

### 4. *Thraulus lepidus*.

*Thraulus lepidus*, Eaton, Rev. Mon. Ephem. p. 109 (1884)<sup>1</sup>.

*Subimago (?) (dried)*.—Wings light sepia-grey, with piceous neuration.

*Imago (dried)*.—Femora banded. Hind wing as in *Th. mexicanus*, the subcosta and radius being attenuated beyond the cross-veinlets that connect the latter with the costal elbow; radius met by three nervures (of which the first and third are forked, and each enclose within the fork an isolated veinlet arising from the margin) and followed by two simple nervures. Ventral lobe of the ninth ♀ abdominal segment narrowed posteriorly and emarginate.

♂. Described in *op. cit.* The original description may be enlarged or modified in the following particulars:—Thorax varied behind with whitish-ochre, and with a blackish stripe along the pleura. Fore femur and tibia rufo-piceous; the former with a black streak from the base to a little beyond the middle, the tibia blackish at the tip; the third and fourth joints of the tarsus only from some standpoints of a darker colour than the remainder. Hind femur with a pale band just beyond the middle. Fore wing strongly tinted in the submarginal area (excepting for a short space just beyond the bulla) with rich brownish-yellow amber-colour; the area at the wing-roots and the ends of the nervures in proximity thereto, like the subcostal edge of the marginal area as far as the bulla, clouded with light raw umber. Great cross-vein piceous posteriorly, but pale towards the costa. Neuration (over white paper) distinct to the naked eye; cross-veinlets fairly numerous in the fore wing, arranged in about eight irregular transverse series, reckoning along the sector from its junction with the cubitus; those in the marginal area before the bulla well defined.

♀. The colouring of the submarginal area of the fore wing hardly extends halfway from the great cross-vein towards the bulla, where again it occupies a short space or forms a small spot; between this and the base of the wing the cross-veinlets in both of the adjacent areas are clouded with the same colouring more distinctly than any of those in the other parts of the wing. In the marginal area are four or five well-defined

cross-veinlets before the bulla, and about twelve beyond it, some of them curved; those in the disk, reckoned along the sector, are disposed in about nine slightly irregular transverse rows, and are scarce at the hind margin. Great cross-vein concolorous with the nervures. In this, as in the other sex, the cross-veinlets viewed in certain directions appear pitch-brown, while the longitudinal nervures are of a lighter or amber-colour.

Length of wing, ♂ 8-9, ♀ 10; setæ, ♂, 15-17 millim.

*Hab.* PANAMA, Chiriqui (*Mus. McLachlan*; ♂ imag.<sup>1</sup>), Volcan de Chiriqui 2500-4000 feet and Bugaba 800 to 1500 feet (*Champion*; two ♂ and one ♀ imag.).

A ♀ subimago in Messrs. Godman and Salvin's collection, from San Isidro, Guatemala (*Champion*), probably belongs to this species.

### 5. *Thraulus valens*, sp. n.

*Subimago (dried).*—Wings light fawn-grey approaching light vandyke-grey; cross-veinlets of fore wing (not of hind wing) black; longitudinal neuration in some lights yellowish, shifting with change of posture to dull light yellowish brown.

*Imago (dried).*—Femora banded. Hind wing nearly as in *Th. mexicanus*, or that figured in Eaton, Rev. Mon. Ephem. t. 13. fig. 23\*<sup>2</sup> (1884). (Ventral lobe of the ninth abdominal segment of ♀ shrunken out of shape, but emarginate.)

♂. Thorax raw umber-brown above, varied posteriorly with light yellow-ochre; mesopleura darker, varied with piceous and ochre. Dorsum of abdomen light raw umber-brown, with the sides and venter lighter and the apical margins of the intermediate segments pitch-brown or black; in segments 2-6 or more an oblique dark streak is produced forwards on each side from the apical border. Setæ whitish, tinged at the base with raw umber; the joinings thereabouts alternately black and grey, but posteriorly all black. Forceps-limbs very long and slender, with the two terminal jointlets very short and minute; basis above their insertion produced behind into a short subacute triangular lobe. Fore femur dark raw umber or rufo-piceous, with a longitudinal black streak extending nearly from the base to the knee, and with the apical margin black; tibia in some positions warmer in tint than the femur, black at the tip; tarsus light raw umber-brown. Hinder femora banded broadly with pitch-brown or blackish near the base and at the tip, leaving the extreme base paler, and a narrow dull whitish amber-coloured space just beyond the middle; tibiæ amber-yellow, with the tip black; tarsi in some lights only more opaque than the tibiæ. Wings vitreous; the fore wing at the extreme base tinged with light yellowish amber or raw umber; longitudinal neuration light yellow-amber, with the basis of the subcosta and radius more or less blackish; cross-veinlets piceous, distinct to the naked eye and numerous, arranged in the disk in about ten or eleven transverse series (reckoning along the sector from its junction with the cubitus) that extend to the posterior margin. The marginal area contains from five to seven well-defined cross-veinlets before the bulla, and fourteen to sixteen beyond it, many of which in the pterostigmatic region fork and anastomose. In the hind wing a grey cloud is enclosed by the blackish great cross-vein and base of the subcosta; the remaining neuration is either light yellowish-amber or colourless.

♀. Very similar, allowing for sexual differences. The marginal area of the fore wing contains about eight cross-veinlets before and eighteen beyond the bulla.

Length of wing, ♂ 11, ♀ 13; setæ, ♂ imag., 23 millim.

*Hab.* PANAMA, Boquete 3500 feet (*Champion*; one ♂ and one ♀ imag.), Caldera 1200 feet (*Champion*; one subimag.), Volcan de Chiriqui 3000 feet (*Champion*; one ♂ imag.).

### 6. *Thraulus hilaris*, sp. n.

*Imago (dried).*—Femora banded. Hind wing nearly the counterpart of that of *Th. mexicanus* figured in Eaton, Rev. Mon. Ephem. t. 13. fig. 23\*<sup>4</sup> (1884). Ventral lobe of the ninth abdominal segment of ♀ emarginate.

- ♂. Thorax pitch-brown, varied behind with light ochre. (Abdomen discoloured—intermediate segments transparent whitish, with oblique broad lateral stripes recurrent from the narrowly piceous apical margins; segments 8–10 opaque.) Setæ whitish, with every joining in the part nearest the base, then every alternate joining, and presently every fourth joining black. Forceps as in *Th. valens*, except that the projecting lobe of the basis is oblong and obtuse. Fore femur intense pitch-brown, with the extreme base (like the coxa) more or less impure whitish, and with a pitch-black streak extending nearly from the base to a little beyond the middle; tibia bistre-brown, piceous at the base and for some distance before the tip; tarsus and tip of tibia whitish-amber. Hinder femora reddish or purplish pitch-brown, with the base and a comparatively narrow band a little beyond the middle whitish; tibiæ and tarsi whitish-yellow-amber colour. Wings vitreous; fore wing with a small piceous cloud at the near end of the pabrachial, a cloudy streak at the near ends of the stems of the præbrachial and sector, and with the borders of the cross-veinlets also faintly clouded; great cross-vein pitch-black, clouded, especially externally, with pitch-brown. Neuration (over white paper) very distinct to the naked eye; in some lights uniformly piceous, in other postures the cross-veinlets become pitch-black and the longitudinal nervures amber colour. Cross-veinlets arranged in the disk in about seven transverse series, reckoned along the sector, that extend to the hind margin; the marginal area contains about seven before and fourteen beyond the bulla, all well defined, of which a few in the pterostigmatic region are linked together. In the hind wing the great cross-vein and the extreme base of the stem of the subcosta are pitch-black.
- ♀. Thorax light raw umber, varied posteriorly with bistre-brown. (Abdomen eroded by cabinet pests.) Joinings of setæ alternately black. The band nearest to the base of the femur is nearly obliterated, but blackish; the coxa and extreme base of the femur are whitish-ochre. In the marginal area of the fore wing about seven cross-veinlets precede and eleven, slightly curved, follow the bulla; in the disk, counted along the sector from its junction with the cubitus, are about eight transverse series of cross-veinlets that extend to the hind margin; neuration rather indistinct to the naked eye.

Length of wing, ♂ 7, ♀ 8; setæ, ♂, 16 millim.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*; one ♀ imag.); GUATEMALA, San Juan in Vera Paz (*Champion*; one ♂ imag.).

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Other species of *Thraulus* are represented in Messrs. Godman and Salvin's collection, but the specimens are unfavourable for description. They are three in number, from as many separate localities, viz.:—one ♀ imag. from Pantaleon, Guatemala (*Champion*); one ♀ imag. and one subimag. from San Gerónimo, Guatemala (*Champion*); and one subimag. from N. Sonora, Mexico (*Morrison*).

Genus — ?

A new genus allied to *Adenophlebia* is represented in Messrs. Godman and Salvin's collection by a single ♀ subimago from San Gerónimo, Guatemala (*Champion*). Referring to the Analysis of the Genera of the *Leptophlebia*-type in Eaton, Rev. Mon. Ephem. p. 313, it would be scheduled thus:—(23) Tarsal claws all narrow and unciniate. (24) Hind wing oblong-ovate, oblique, strongly angulated in front, with the marginal area of nearly uniform width from the base to the angle and then obliquely acuminate.—The first and second axillar nervures meet near the roots of the fore wing. Ventral lobe of the ninth abdominal segment (injured at the present time) formerly

noted as "emarginate or shortly excised;" posterior lateral angles of the dorsum of the same segment acutely produced. Setæ (now lost) 3, subequal. Tarsi as in *Adenophlebia*; intermediate leg of ordinary proportions.

The specimen in dying began to shed its slough. The following particulars are noteworthy concerning it:—Wings sepia-brown, with pitch-black neuration variable in detail; in the marginal area of the fore wing are about seven cross-veinlets before and thirteen beyond the bulla; those in the disk are rather irregular in their arrangement. Setæ very light sepia-grey, with black joinings. Body piceous. Fore femora piceous; tibiæ and tarsi lighter. Hinder femora seemingly with a narrow pale band nearly in the middle.

Length of wing 9 millim.

### EPHEMERELLA.

*Ephemerella*, Walsh, Proc. Acad. Phil. 1862, p. 377; Eaton, Rev. Mon. Ephem. p. 124, t. 14. figg. 24 a-c (adult details) and t. 37 (nymph) (1884).

This genus inhabits Northern Temperate regions, ranging to the Kullu Himalaya. Probably largely represented in America, whence six species and several allied nymphs have been described, and others are extant in collections (*cf.* Eaton, *op. cit.* p. 131).

A ♀ subimago in Messrs. Godman and Salvin's collection, labelled N. Sonora, Mexico (*Morrison*), gives indication of the southerly range of this genus in America.

### TRICORYTHUS.

*Tricorythus*, Eaton, Ent. Monthly Mag. v. p. 82 (1868); Rev. Mon. Ephem. p. 138, t. 15. fig. 25 (1884) (adult details) (nymph, t. 41, doubtfully referred here).

A small African, Malayan, and Subtropical American genus, of doubtful occurrence in the south of Europe.

#### 1. *Tricorythus explicatus*, sp. n. (Tab. I. figg. 8, 8 a.)

*Adult (dried)*.—♂. Body pitch-black, slightly browner in some (doubtless just moulted) specimens. Wings vitreous; neuration indistinct to the naked eye, except when held up to the light; subcosta and radius, except near the base of the wing, greyish-black. Femora pitch-brown, as are also the anterior tibiæ in some lights; hinder tarsi and tibiæ towards their lower extremities impure yellowish-white or pale amber. Setæ (flattened in drying) vitreous, with black edges and joinings.

♀. Very similar to the ♂, but with the body pitch-brown.

Length of body, ♂ 4, ♀ 3; wing, ♂ 5, ♀ 7; setæ, ♂ about 10, ♀ 3.5 millim.

*Hab.* MEXICO, N. Sonora (*Morrison*; forty-one ♂, four ♀).

The wing of this species differs from that figured by me in the year 1884, cited above, in the following particulars:—Marginal area devoid of cross-veinlets; the anterior intercalary nervure of the anal-axillar interspace meets the first axillar nervure



more obliquely, and in some specimens is in direct continuity with that part of this nervure which precedes their junction; the posterior intercalary nervure of the pabrachial-anal interspace ( $7' = \text{postical}$ ) is often detached from the pabrachial; and the cross-veinlets are fewer or more restricted in their distribution. In the ♀ the posterior lateral angles of the dorsum of the eighth abdominal segment are nearly right-angled; those of segment 9 acuminate, but not setaceous. In the ♂ (hitherto undescribed in detail in this genus) the forceps basis is entire; forceps-limbs apparently tri-articulate, with the basal joint nearly half the length of the whole; penis exposed, turned upwards, narrow, bifid, with the points connivent. The head of the fly is conformable to that of *Cænis*.

### LEPTOHYPHES.

*Leptohyphes*, Eaton, Ent. Monthly Mag. xviii. p. 208 (1882); Rev. Mon. Ephem. p. 140, t. 15. fig. 25 bis (1884).

A small genus, previously known only by a single species from the Argentine Republic.

#### 1. *Leptohyphes brevissimus*, sp. n. (Tab. I. fig. 9, ♀.)

*Adult (dried).*—♀. Body dark pitch-brown. Femora and extreme bases of tibiæ lighter pitch-brown; tarsi and remainder of tibiæ impure whitish. Setæ white. Length of body 2; wing 4.5–5.5; setæ 2 millim.

*Hab.* GUATEMALA, Zapote (*Champion*; three ♀).

But for M. Vayssière's representation of the subimago of *Prosopistoma* with hind wings [*cf.* Ann. des Sc. Nat. (6), Zool. xi. t. 1 (1881)], I would have suspected the fly of that nymph to be a *Tricorythus*, judging from the form of the ♀ thorax and abdomen in these genera, and their relative proportions. At all events, the nymph of *Leptohyphes* must be of very much the same make as *Prosopistoma*; and *Cænis* ought not to intervene between them or be scheduled with *Tricorythus* and *Leptohyphes* so intimately as was done in my Revisional Monograph. Considerable latitude in subsidiary details of neuration must be allowed for when wings of individual specimens in any of these three genera are compared with published figures. In some wings of *L. brevissimus*, the second axillar nervure ( $9^2$ ) is less strongly arched than in others (*e. g.* than in that one which is here represented), and sometimes the roundly curved first axillar dies away in the wing-membrane short of the margin; the intercalary nervures of the anal-axillar interspace also vary considerably in their mode of attachment, their common stem meeting the first axillar without any interposition of cross-veinlets, and being linked to the anal nervure by a single cross-veinlet placed at about the middle of their stem. The subulate membranous appendages that in some specimens project beyond the scutellum (as described in Rev. Mon. Ephem. p. 140) are probably distinctive of the

subimago, and indicate the possession of a notal hood by the advanced nymph. Their homologues, present in the subimago of *Ephemerella notata*, are not retained by the imago. The wings of *Leptohyphes* are fringed, and the ventral lobe of the ninth abdominal segment is well developed, with the extreme tip subacute and deflected upwards.

### BAËTIS.

*Baëtis*, Leach, Brewst. Edin. Encycl. ix. 137 (1815); Eaton, Rev. Mon. Ephem. p. 156, tt. 16, 17. figg. 29 *a-f* (adult details), and t. 44 (nymph) (1884-5).

Species of this genus are numerous in most parts of the world. Many of them are distinguished by characters which cannot be observed in dried specimens (such as the form of the male genitalia), and are devoid of any other particularly distinctive characteristics sufficient to mark them off each from its nearest allies. Descriptions made from the dried insect are of little practical use in such cases, where even actual comparison of specimens hardly yields anything whereby identification of species can be decided.

#### 1. *Baëtis salvini*.

*Baëtis salvini*, Eaton, Rev. Mon. Ephem. p. 170, t. 16. fig. 29 *a* (adult ♂ details) (1885)<sup>1</sup>.

*Hab.* GUATEMALA, Zapote (one ♀ imag.), Cerro Zunil (one ♂ subimag.), and Panima in Vera Paz (one ♂ and two ♀ imag.) (*Champion*); COSTA RICA, Volcan de Irazu 6000 to 7000 feet (*Rogers*<sup>1</sup>; subimag., ♂ imag.).

The subimago from Cerro Zunil has light sepia-brown wings with pitch-brown neuration, and the condensation of colouring along the margins of the nervures and cross-veinlets is noticeable only in a very small part a little beyond the middle of the wing. The difference between it and the specimen from the Volcan de Irazu described in the Rev. Mon. Ephem.<sup>1</sup> may perhaps be due to its being less advanced towards moulting.

The ♂ imago from Panima has the femoral markings rather lighter, and the markings of the setæ not in exact accordance with those of specimens from Irazu described in 1885. The coloration of the body is well preserved, which was not the case in the specimens referred to. Thorax light pitch-brown or raw umber above, varied with light ochreous yellow; metanotum pitch-brown. Dorsum of abdomen of a rich pitch-brown, with oblique lateral markings that are concolorous with the light ochreous or flavescent venter, and leave a broad serrate lateral stripe of the darker colour along the pleura and extreme edge of the venter. The lighter markings are in segments 2-8 an oblique longitudinal stripe on each side of the back, broad in segments 3-5, and successively narrower in segments 6-8; the stripe is faintly indicated in the ninth segment, which has in addition a triangular spot of the same colour at the apical margin just above the pleura. The tenth dorsal segment, likewise largely of that colour, has a median ovate very light

brownish spot extending its whole length. The joinings of the ventral segments, as well as the lateral margins of the second to the eighth segments, are narrowly pitch-brown; the lateral borders of the ninth segment broadly so. Forceps brownish in the first and second joints, pitch-black in the third and fourth. Setæ pitch-brown, with the basal part of a joint here and there whitish, viz.:—counting from the roots, the base of the fifth joint narrowly whitish; one third of the seventh joint whitish; more of the ninth joint whitish; then for some distance until nearly the end of the seta about half of every fourth joint whitish; and then the whitish markings are reduced in width and soon finally disappear. Wings nearly as in the type, but the marginal and submarginal areas of the fore wing each contain two small fuscous clouds before the bulla. The band near the middle of the fore femur is indistinct.

The ♀ imago resembles the ♂ in many respects; but while the greater part of the neuration of the wing is pitch-black, the subcosta and radius are mostly pitch-brown, and neither the extreme base of the wing nor the cross-veinlets are clouded or bordered with fuscous.

Length of body 8–9; wing 10–11.5; setæ, ♂ imag. about 27, subimag. 20, ♀ imag. about 25 millim.

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Three other species of *Baëtis*, more nearly related than *B. salvini* to the European forms, are represented in the collection referred to; but for reasons above stated it seems inexpedient to name any of them. It will suffice to catalogue them with record of localities.

**Baëtis — ?**

*Hab.* MEXICO, Orizaba (*H. H. Smith*; one ♀ subimag.).

**Baëtis — ?**

*Hab.* MEXICO, N. Sonora (*Morrison*; eight ♀, two ♂ subimag., one ♂ and one ♀ imag.).

**Baëtis — ?**

*Hab.* MEXICO, N. Sonora (*Morrison*; eight ♂, seven ♀ subimag., seventeen ♂, two ♀ imag.).

CENTROPTILUM.

*Centroptilum*, Eaton, Ent. Monthly Mag. vi. p. 132 (1869); Rev. Mon. Ephem. p. 174, t. 17. figg. 30 a–c (adult details) and t. 46 (nymph) (1884–5).

A comparatively small genus, widely distributed in Europe and North America, and recorded from Cuba.

1. **Centroptilum** —?

*Hab.* MEXICO, N. Sonora (*Morrison*; one ♀ imag.).

The intercalary veinlets at the hind margin of the fore wing of this species are single.

## CALLIBÆTIS.

*Callibætis*, Eaton, Ent. Monthly Mag. xvii. p. 196 (1881); Rev. Mon. Ephem. p. 191, t. 16. figg. 28 *a-d* (adult details) and t. 48 (nymph) (1884-5).

A genus apparently numerous in North and South America, found also in Australia.

1. **Callibætis pictus**.

*Baëtis pictus*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 122, t. 5. fig. 27 (detail) <sup>1</sup>.

*Callibætis pictus*, Eaton, Rev. Mon. Ephem. p. 195, t. 16. fig. 28 *c* (adult details) (1884-5) <sup>2</sup>.

? *Cloë undata*, Pictet, Hist. Nat. Néuropt. ii., Ephém. p. 264, t. 41. fig. 5 (1843-5) <sup>3</sup>.

*Hab.* NORTH AMERICA, Texas <sup>1 2</sup>, California <sup>2</sup>.—MEXICO <sup>3 4</sup>, Amecameca in Morelos (*F. D. Godman*), Orizaba (*H. H. Smith*); GUATEMALA, near the city, Aceytuno <sup>2</sup> (*Salvin*), Dueñas, Capetillo (*Champion*).

2. **Callibætis montanus**.

*Callibætis montanus*, Eaton, Rev. Mon. Ephem. p. 196, t. 16. fig. 28 *d* (adult details) (1884-5).

*Subimago* (*dried*).—♀. Wings bistre-grey, transparent, tinged with raw umber-brown in the darker parts along the anterior margin and near the base. Neuration raw umber-brown, excepting some of the cross-veinlets in the disk nearest to the wing-roots, and the weaker of those in the marginal area, which are in some lights whitish. The whitish cross-veinlets in that area are narrowly bordered with whitish. Setae light brown, with darker joinings.

Length of wing 8 millim.

*Hab.* GUATEMALA, Aceytuno 5100 feet (*Salvin*; one ♀ imag. in *Mus. McLachlan*), Dueñas (*Champion*; one ♀ subimag.).

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Another species of *Callibætis* is represented in Messrs. Godman and Salvin's collection by a ♀ subimago, labelled N. Sonora, Mexico (*Morrison*). It resembles *C. montanus* in size, but is of a lighter colour and has fewer cross-veinlets in the marginal area of the fore wing.

## CHIROTONETES.

*Chirotonetes*, Eaton, Ent. Monthly Mag. xviii. p. 21 (1881); Rev. Mon. Ephem. p. 203, t. 18. figg. 33 *d-e*, t. 19. figg. 33 *a, b, ? c* (adult, details), and t. 49 (nymph) (1884-5).

Most of the few species known of *Chirotonetes* are North American; but the genus

is represented in Europe and Japan, the Tenasserim valley, and Sumatra. The Central-American specimens in Messrs. Godman and Salvin's collection possibly represent only one species.

### 1. *Chirotonetes* — ?

*Hab.* MEXICO, N. Sonora (*Morrison*; one ♀ subimag.), Atoyac in Vera Cruz (*Schuman*; one ♂ imag.), Teapa in Tabasco (*H. H. Smith*; one ♀ subimag.); GUATEMALA, San Gerónimo (*Champion*; one ♀ subimag.).

The forceps basis of the male resembles that of *Ch. siccus*, Walsh (*cf.* Eaton, Rev. Mon. Ephem. t. 18. fig. 33 *d*), but in that species the penis-lobes are narrower than in the one here catalogued.

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The *Ecdyurus*-type of genera is represented in Messrs. Godman and Salvin's collection by two species—one from Guatemala, the other Mexican.

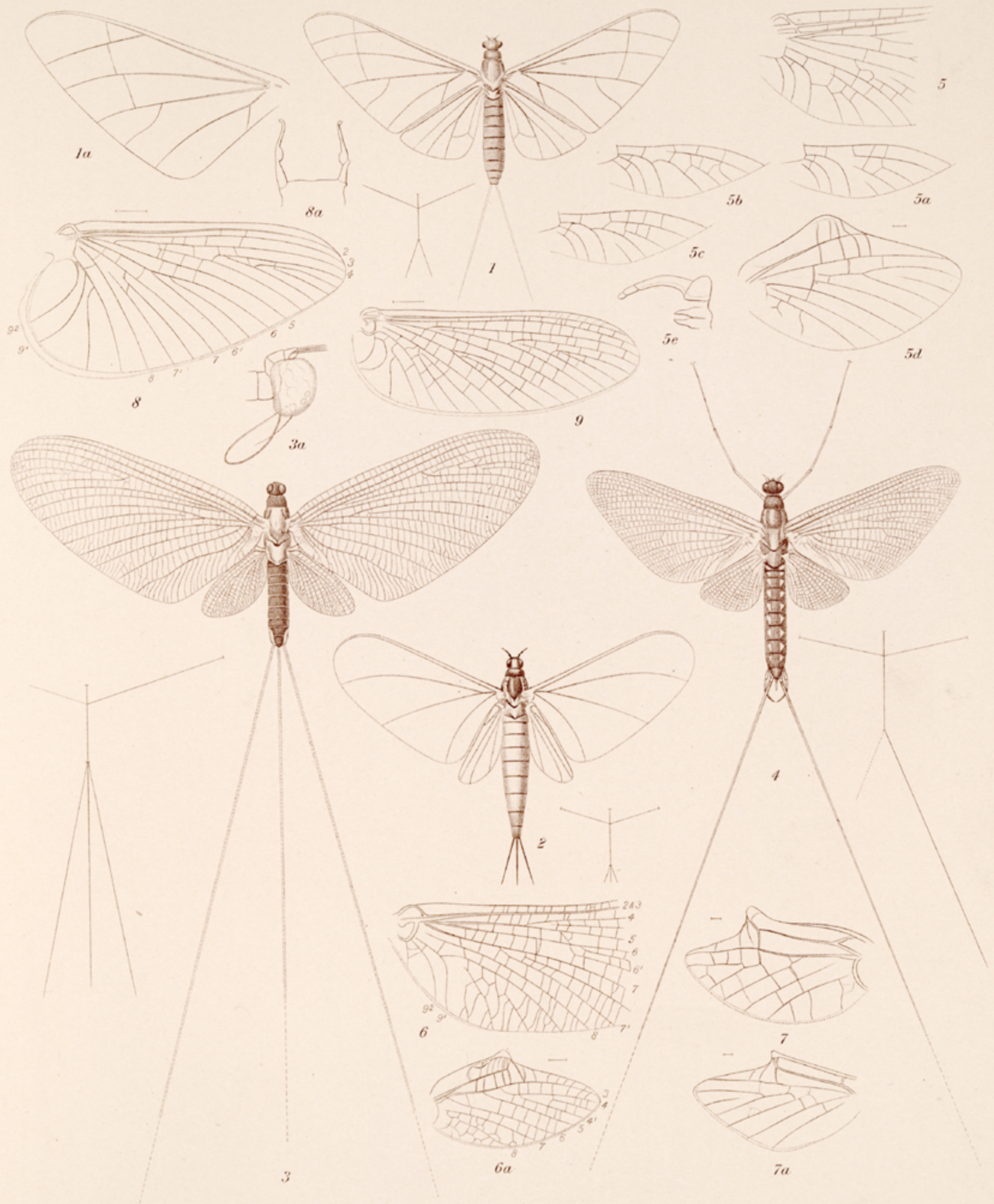
Of the first-mentioned species, the genus cannot be ascertained from the single specimen extant, which is a ♀ subimago deprived of all of its legs and setæ, except the femur and part of the tibia of one of the fore legs. The specimen is labelled Panima, Guatemala (*Champion*).

The second species, represented by eight subimag. and one ♂ imag., labelled N. Sonora, Mexico (*Morrison*), agrees with *Cinygma*, a N.-American genus, in many particulars (*cf.* Eaton, Rev. Mon. Ephem. p. 247). Thus, in the order of their shortening, the joints of the ♂ hind tarsus rank 5, 1, 2, 3, 4, and the first joint of the male fore tarsus is shorter than the second; the colour of the wings of the subimago and the colouring of the femora are also in agreement with the characters of *Cinygma*. But the ♂ fore tarsus (there is only one remaining) shortens its joints in the following order,—3, 2, 4, 5, 1, whereas in *Cinygma* the first joint is much longer than the fifth joint; and the lobes of the penis spread rather widely at the tips for a *Cinygma*. In the absence of the ♀ imag., and of a series of the ♂ imag., it is inexpedient to describe the species.

## NEUROPTERA.—EPHEMERIDÆ.

### PLATE I.

- Fig. 1. *Lachlania lucida*, adult ♀: 1 *a*, wing of another specimen, with the intermediate cross-veinlet out of position.
2. *Homæoneuria salvinia*, adult ♀.
3. *Euthyplocia hecuba*, adult ♀: 3 *a*, end of ♀ abdomen with setæ cut short, showing in lateral profile the extruded ovisac and a peculiar chitinous bristle, seemingly arising from the middle of the apical ventral margin of the seventh segment, associated with the sac.
4. *Hexagenia mexicana*, adult ♂.
5. *Choroterpes inornata*, details of adult: 5, 5 *a-c*, parts of fore wings, showing variations in the neuration of the anal-axillar areas; 5 *d*, hind wing; 5 *e*, partial view of ♂ genitalia.
6. *Choroterpes nervosa*, details of adult ♀: 6, part of fore wing, showing numerous cross-veinlets and the neuration of the anal-axillar areas; 6 *a*, hind wing.
7. *Thraulius primanus*, details of adult: 7, hind wing of ♀; 7 *a*, ditto of ♂.
8. *Tricorythus explicatus*, details of adult: 8, wing of adult, the stippled line showing the extent of the fringe; 8 *a*, forceps of ♂.
9. *Leptohyphes brevissimus*, detail of adult: wing of ♀, the stippled line showing the extent of the fringe.



1, 1a ♀	LACHLANIA LUCIDA.	4 ♂	HEXAGENIA MEXICANA.	7, 7a	THRAULUS PRIMANUS.
2 ♀	HOMŒONEURIA SALVINIÆ.	5, 5a e	CHOROTERPES INORNATA.	8, 8a	TRICORYTHUS EXPLICATUS.
3, 3a ♀	EUTHYPLOCIA HECUBA.	6, 6a	NERVOSA.	9	LEPTOHYPHES BREVISSIMUS.